

M. J. Dorsey

BOTANICAL ABSTRACTS

A monthly serial furnishing abstracts and citations of publications in the international field of botany in its broadest sense

PUBLISHED MONTHLY UNDER THE DIRECTION OF

THE BOARD OF CONTROL OF BOTANICAL ABSTRACTS, INC.

A democratically constituted organization, with members representing many societies interested in plants.

THE SOCIETIES NOW REPRESENTED

AND

THE MEMBERS OF THE BOARD OF CONTROL

(The Members of the Executive Committee for 1921 are indicated by asterisks)

American Association for the Advancement of Science, Section G.

R. A. HARPER, Columbia University, New York City.

B. E. LIVINGSTON, Johns Hopkins University, Baltimore, Maryland.

Botanical Society of America, General Section.

H. A. GLEASON, New York Botanical Garden, New York City.

*B. M. DAVIS, University of Michigan, Ann Arbor, Michigan.

Botanical Society of America, Physiological Section.

OTIS F. CURTIS, Cornell University, Ithaca, New York.

*B. M. DUGGAR (*Chairman of the Board*), Missouri Botanical Garden, St. Louis, Missouri.

Botanical Society of America, Systematic Section.

MARSHALL A. HOWE, New York Botanical Garden, New York City.

J. H. BARNHART, New York Botanical Garden, New York City.

Botanical Society of America, Mycological Section.

C. H. KAUFFMAN, University of Michigan, Ann Arbor, Michigan.

BRUCE FINK, Miami University, Oxford, Ohio.

American Society of Naturalists.

H. H. BARTLETT, University of Michigan, Ann Arbor, Michigan.

*J. A. HARRIS, Station for Experimental Evolution, Cold Spring Harbor, L. I., New York.

Ecological Society of America.

H. L. SHANTZ, U. S. Bureau of Plant Industry, Washington, D. C.

*FORREST SHREVE, Desert Laboratory, Carnegie Institution, Tucson, Arizona.

Paleontological Society of America.

ARTHUR HOLLICK, 61 Wall Street, New Brighton, New York.

E. W. BERRY, Johns Hopkins University, Baltimore, Maryland.

American Society of Agronomy.

C. B. HUTCHISON, Cornell University, Ithaca, New York.

C. A. MOOERS, University of Tennessee, Knoxville, Tennessee.

Society for Horticultural Science.

V. R. GARDNER, University of Missouri, Columbia, Missouri.

E. J. KRAUS, University of Wisconsin, Madison, Wisconsin.

American Phytopathological Society.

L. R. JONES, University of Wisconsin, Madison, Wisconsin.

*DONALD REDDICK, Cornell University, Ithaca, New York.

Society of American Foresters.

RAPHAEL ZON, U. S. Forest Service, Washington, D. C.

J. S. ILLICK, Pennsylvania Department of Forestry, Harrisburg, Pennsylvania.

American Conference of Pharmaceutical Faculties.

HEBER W. YOUNGKEN, Philadelphia College of Pharmacy and Science, Philadelphia, Pennsylvania.

HENRY KRAEMER.

Canadian Society of Technical Agriculturists.

W. P. THOMPSON, University of Saskatchewan, Saskatoon, Saskatchewan.

B. T. DICKSON, Macdonald College, Macdonald College, Quebec.

Royal Society of Canada.

No elections.

At large.

W. A. ORTON, U. S. Bureau of Plant Industry, Washington, D. C.

WILLIAMS & WILKINS COMPANY

BALTIMORE, U. S. A.

Entered as second-class matter, November 9, 1918, at the post office at Baltimore, Maryland, under the Act of March 3, 1879

Copyright 1921, Williams & Wilkins Company

Price, net postpaid, per volume: { \$3.00, United States, Mexico, Cuba
\$3.12, Canada
\$3.25, Other countries

CONTENTS

Agronomy.....	1- 54
Bibliography, Biography and History.....	55- 76
Botanical Education.....	77- 87
Ecology and Plant Geography.....	88-147
Forest Botany and Forestry.....	148-207
Genetics.....	208-355
Horticulture.....	356-431
Morphology, Anatomy and Histology of Vascular Plants.....	432-445
Morphology and Taxonomy of Bryophytes.....	446-455
Morphology and Taxonomy of Fungi, Lichens, Bacteria and Myxomycetes.....	456-483
Paleobotany and Evolutionary History.....	484-495
Pathology.....	496-579
Pharmaceutical Botany and Pharmacognosy.....	580-598
Physiology.....	599-674
Soil Science.....	675-682
Taxonomy of Vascular Plants.....	683-751
Miscellaneous, Unclassified Publications.....	752-760

BOARD OF EDITORS FOR 1921 AND ASSISTANT EDITORS

Editor-in-Chief, J. R. SCHRAMM
Cornell University, Ithaca, New York

EDITORS FOR SECTIONS

Agronomy. C. V. PIPER, U. S. Bureau of Plant Industry, Washington, D. C.—Assistant Editor, MARY R. BURR, U. S. Bureau of Plant Industry, Washington, D. C.

Bibliography, Biography and History. NEIL E. STEVENS, U. S. Bureau of Plant Industry, Washington, D. C.

Botanical Education. C. STUART GAGER, Brooklyn Botanic Garden, Brooklyn, New York.—Assistant Editor, ALFRED GUNDERSEN, Brooklyn Botanic Garden, Brooklyn, New York.

Cytology. GILBERT M. SMITH, University of Wisconsin, Madison, Wisconsin.—Assistant Editor, GEO. S. BRYAN, University of Wisconsin, Madison, Wisconsin.

Ecology and Plant Geography. H. C. COWLES, The University of Chicago, Chicago, Illinois.—Assistant Editor, GEO. D. FULLER, The University of Chicago, Chicago, Illinois.

Forest Botany and Forestry. RAPHAEL ZON, U. S. Forest Service, Washington, D. C.—Assistant Editor, J. V. HOPMANN, U. S. Forest Service, Wind River Experiment Station, Stabler, Washington.

Genetics. GEORGE H. SHULL, Princeton University, Princeton, New Jersey.—Assistant Editor, J. P. KELLY, Pennsylvania State College, State College, Pennsylvania.

Horticulture. J. H. GOURLEY, West Virginia University, Morgantown, West Virginia.—Assistant Editor, H. E. KNOWLTON, West Virginia University, Morgantown, West Virginia.

Miscellaneous, Unclassified Publications. BURTON E. LIVINGSTON, The Johns Hopkins University, Baltimore, Maryland.—Assistant Editor, SAM F. TRELEASE, The Johns Hopkins University, Baltimore, Maryland.

Morphology, Anatomy and Histology of Vascular Plants. E. W. SINNOTT, Connecticut Agricultural College, Storrs, Connecticut.

Morphology and Taxonomy of Algae. E. N. TRANSEAU, Ohio State University, Columbus, Ohio.

Morphology and Taxonomy of Bryophytes. ALEXANDER W. EVANS, Yale University, New Haven, Connecticut.

Morphology and Taxonomy of Fungi, Lichens, Bacteria and Myxomycetes. H. M. FITZPATRICK, Cornell University, Ithaca, New York.

Paleobotany and Evolutionary History. EDWARD W. BERRY, The Johns Hopkins University, Baltimore, Maryland.

Pathology. G. H. COONS, Michigan Agricultural College, East Lansing, Michigan.—Assistant Editor, C. W. BENNETT, Michigan Agricultural College, East Lansing, Michigan.

Pharmaceutical Botany and Pharmacognosy. HEBER W. YOUNGKEN, Philadelphia College of Pharmacy and Science, Philadelphia, Pennsylvania.—Assistant Editor, E. N. GATHERCOAL, 701 South Wood St., Chicago, Illinois.

Physiology. B. M. DUGGAR, Missouri Botanical Garden, St. Louis, Missouri.—Assistant Editor, CARROLL W. DODGE, Brown University, Providence, Rhode Island.

Soil Science. J. J. SKINNER, U. S. Bureau of Plant Industry, Washington, D. C.—Assistant Editor, F. M. SCHERTZ, U. S. Bureau of Plant Industry, Washington, D. C.

Taxonomy of Vascular Plants. J. M. GREENMAN, Missouri Botanical Garden, St. Louis, Missouri.—Assistant Editor, E. B. PARSON, Missouri Botanical Garden, St. Louis, Missouri.

BIBLIOGRAPHY COMMITTEE FOR 1921

J. R. SCHRAMM, *Chairman*, Cornell University, Ithaca, New York

H. O. BUCKMAN

W. H. CHANDLER

A. J. EAMES

R. A. EMERSON

H. M. FITZPATRICK

K. M. WIEGAND

R. S. HARRIS, *Secretary*

R. HOSMER

L. KNUDSON

E. G. MONTGOMERY

D. REDDICK

L. W. SHARP

BOTANICAL ABSTRACTS

A monthly serial furnishing abstracts and citations of publications in the international field of botany in its broadest sense.

UNDER THE DIRECTION OF

THE BOARD OF CONTROL OF BOTANICAL ABSTRACTS, INC.

J. R. SCHRAMM, Editor-in-Chief
Cornell University, Ithaca, New York

Vol. VIII

MAY, 1921
ENTRIES 1-760

No. 1

AGRONOMY

C. V. PIPER, *Editor*

MARY R. BURR, *Assistant Editor*

(See also in this issue Entries 74, 77, 87, 237, 238, 239, 329, 355, 510, 529, 552, 553, 613, 621, 630, 677, 678, 679, 693, 724)

1. ADKINS, D. M. The soya-bean problem. *Sci. Prog.* [London] 15:445-451. 1921.—A brief account is given of the history, economic value, and methods of cultivating the soya-bean.—*J. L. Weimer.*

2. ANONYMOUS. Cotton for automobile tires. *Sci. Amer.* 122:603. 2 fig. 1920.—A brief account of the growing of long-fiber cotton in the Salt River Valley of Arizona.—*Chas. H. Otis.*

3. ANONYMOUS. Cyprus grown tobacco. *Cyprus Agric. Jour.* 14, 15:148-149. 1919, 1920.—Smyrna and Cavalla leaf tobacco produced at Nicosia, Cyprus, contained rather large amounts of nicotine and nitrogen, while the ash had a low percentage of potash. It is believed that with proper knowledge, skill, and care a tobacco leaf can be produced in Cyprus that could be sold in the London market at satisfactory prices.—*W. Stuart.*

4. ANONYMOUS. Failure of potatoes in Cyprus. *Cyprus Agric. Jour.* 15:214. 1920.—Potato growers in Cyprus suffer their chief losses to the summer potato crop, which is normally harvested in May or June. The intense heat of that period makes it difficult to keep the tubers.—*W. Stuart.*

5. ANONYMOUS. Early potatoes at Wisley 1919. *Jour. Roy. Hort. Soc.* 45:360-367. 1919.—Report is made of a test of 121 stocks of early potatoes. The awards of the fruit and vegetable committee and a classification with brief descriptions are given.—*J. K. Shaw.*

6. ANONYMOUS. Fodder plants. *Cyprus Agric. Jour.* 15:204-206. 1920.—The article is devoted to a brief description of some fodder plants: The Moha [Hungarian millet], Sudan grass, buckwheat, white French millet, prickly comfrey, and banana stems.—*W. Stuart.*

7. ANONYMOUS. Periods for which seeds retain their germinating power. *Cyprus Agric. Jour.* 15:213. 1920.—It has been found that oats retain their germinating power 2 years; buckwheat 2-3 years; hemp 3 years; wheat and barley 3-4 years; rye, carrots, and lucerne 4 years; beans, peas, and flax 5 years; cabbage, 5-6 years; and beets 6-7 years.—*W. Stuart.*

8. ANONYMOUS. [Program of work in progress at the cotton experiment stations of the Chinese Cotton Mill Owners' Association.] Hua-Shang-Sha-Chang-Lien-Ho-Hui-Ki-Kan [China Cotton Jour.] 21: 229-247. 1920.—Reports for the fiscal year ending 1920 of the work at 1 central experiment station and 16 sub-stations with a total area of 1300 mows (Chinese acres). The features reported are: Location, date of establishment, soil conditions, procedure of work, training of students, varieties of cotton, diseases and pests, and results.—*Chunjen C. Chen.*

9. ANONYMOUS. Sulphur as a fertilizer for potatoes. Cyprus Agric. Jour. 15: 192. 1920.—The experiments noted were conducted on a farm in Chili, the soil of which was rich in organic substances. The application of sulphur on one plot of potatoes gave an increase over the plots without sulphur of 72 per cent and on another plot an increase of 65 per cent.—*W. Stuart.*

10. ANONYMOUS. [Rev. of: HARRIS, F. S. The sugar-beet in America. Rural Science Series. xviii + 342 p. Macmillan Company: New York, 1919.] Sci. Prog. [London] 14: 511. 1920.

11. BARBER, C. A. Millets for fodder on sugar estates. Internat. Sugar Jour. 22: 684-686. 2 pl., 4 fig. 1920.—This third paper gives additional descriptive notes and data on three of the lesser millets which are most productive: Bulrush millet (*Pennisetum typhoides*), Italian millet (*Setaria italica*), and Ragi (*Eleusine coracana*).—*C. Rumbold.*

12. BORNEMANN. Kohlensäure und Pflanzenwachstum. [Carbonic acid and plant growth.] Mitteil. Deutsch. Landw. Ges. 35: 693-695. 1920.—More CO₂ is evolved from well manured and well cultivated land than from that unmanured or uncultivated. The purpose of the present experiments was to determine whether the larger yields secured under good cultivation were due in part, at least, to the larger amounts of CO₂ available to the crop. A portion of the garden was laid out into 12 beds, 6 of which were provided with piping by which CO₂ was supplied. Peas, oats, barley, potatoes, onions, and kohlrabi were grown. The plants in the beds supplied with CO₂ were later, larger, and more productive than those in the check beds. The following table gives some of the data presented:

	WEIGHT OF CROP IN GRAMS		PER CENT GAIN
	Without CO ₂	With CO ₂	
Peas.....	532	766	44.1
Oats.....	706	1191	68.7
Potatoes.....	2160	3080	42.6
Onions.....	621	1924	210.0
Kohlrabi (KG).....	11	13	18.2

—*A. J. Pieters.*

13. CRAFTS, H. A. What about our wheat production? Sci. Amer. 123: 376, 391. 1920.—Use of good crop rotations to increase the yields of wheat and other crops is discussed. Alfalfa and sugar beets can be utilized for their favorable effects.—*Chas. H. Otis.*

14. DEAN, H. K. The work of the Umatilla Reclamation Project Experiment Farm in 1918 and 1919. U. S. Dept. Agric. Dept. Circ. 110. 3-24, fig. 1-6. 1920.—Data are presented on: Comparative importance of the alfalfa crop during the 9-year period, 1911-1919 inclusive; acreage and yields and farm values of crops; noxious weeds; crop experiments; tests of silage crops; lysimeter work; soil fertility; alfalfa varieties; sheep feeding experiments; and orchard culture experiments.—*L. R. Hesler.*

15. DUNN, H. HAMMOND. **Dunn's on seed wheats.** Salisbury, England. [No date (1920?).]—There are included, among other matter, brief articles with the following captions: A short history of wheat cultivation in Britain; men who have helped towards a great wheat production; botanical notes on wheat; what a grain of wheat contains; manures for wheat; diseases and pests of wheat; varieties of seed wheat; yields of wheat.—*C. Stuart Gager.*

16. DEERR, NOËL. **The origin of the Uba and Cavengerie canes.** Internat. Sugar Jour, 22: 680-681. 1920.—Through correspondence with DANIEL DE PASS lately of the Réunion Estate in Natal with regard to the origin of the Uba cane, it appears that the firm of de Pass imported cane from both India and Mauritius to Natal. A cane believed by Mr. de Pass, Sen., to have come from India was planted by him. The label had been damaged, only the letters "Uba" were plain and at the time it was thought the letters represented but a part of the name. As the firm of de Pass obtained cane from India and Mauritius at nearly the same time, it is conceivable that the package thought to have come from India really came from Mauritius. The author then suggests a possible sequence of events covering the origin of the Uba cane, if it came from Mauritius. Cavengerie cane originated in New Caledonia and was taken to Mauritius. It was brought into Porto Rico in 1872; was taken to Brazil where it was called Louzier and under this name was sent to Argentina. It is also grown in Australia, where in some places it is misnamed Cheribon. A similar name, Kavangire, has been applied to the Uba cane, but where and how the name Kavangire was transferred to the Uba cane is not known.—*C. Rumbold.*

17. FABER, HARALD. **The growing of forage crops on the dairy farms of Denmark.** Scottish Jour. Agric. 3: 16-26. 1920.—The expansion of the forage crops of Denmark was occasioned by the quantities of cheap grain which came to Europe in the latter part of the nineteenth century. The acreage in roots increased from 6000 in 1861 to 678,000 in 1919. At present 1,900,000 acres are in grass and clover under rotation while 1,100,000 acres are in permanent grass. All the forage roots and most of the grasses are grown from high-yielding strains of Danish seed.—*H. V. Harlan.*

18. FINDLAY, WILLIAM M. **Potato synonyms.** Scottish Jour. Agric. 3: 202-207. 1920.—The varieties of potatoes reported were grown at the experimental farm of the North of Scotland College of Agriculture, at Craibstone. The synonyms are not necessarily ones of identical strain but of almost identical type. Fifteen varieties of the Duke of York, 32 of British Queen, 28 of Abundance, and 72 of "Up to date" are reported. The yields recorded show that in most instances the synonymous variety differed more from the type variety in the 1st and 2nd crops after it was acquired than was the case later.—*H. V. Harlan.*

19. GEMMILL, J. F. **Wheat-bulb disease.** Nature 106: 148. 1920.—The paper refers to infection by larvae of a fly (*Hylemyia coarctata*) which caused much damage in the east of Scotland during the past season. The eggs are laid among root crops, especially potatoes, and on fallow ground, so that the recommendations of recent German investigators that wheat should be preceded by root crops is based on error.—*O. A. Stevens.*

20. GESSNER, E. R. **Sugar cane farming for the beginner.** [Reprint of Winklespruit Government Experiment Station Bulletin issued in 1919.] South African Sugar Jour. 4: 1137-1195. 1920.—A practical account of sugar cane farming in South Africa is given with a discussion of climate, soil, field operations, varieties, and harvesting. The cane belt in South Africa is a narrow strip of country from Port Shepstone on the south to just beyond Samkele on the north. The climate of Zululand is more suited to cane growing than is that of Natal, owing to its greater humidity and heat. The two most valuable types of soil in the cane area are Red Hillside and Black Vlei. The former is more readily brought into good condition for planting—the latter requires more experience in handling. There is a 3rd soil type found along the river bank and flats, liable to flooding by heavy rains, but of excellent productivity when the weather conditions are favorable. From experiments at the Winklespruit

station it was found that cane 12 months old is best for planting. Middle and tip portions of cane give better growth than butts for both the Uba, the standard variety, and the Agual, a recent introduction from India. Uba has long proved best adapted to local conditions. In Natal and Zululand fertile seed has never been produced by this variety, which makes crossing with Uba cane impossible in this section. Soft canes are seldom grown in this country. Several varieties have been tested at the experiment station and work is being continued with the more promising ones.—*E. Koch Tisdale*.

21. HANSEN, ALBERT A. **Chicory, control and eradication.** U. S. Dept. Agric. Dept. Circ. 108. 2-4. *Fig. 1.* 1920.—Chicory, a troublesome weed in pastures, meadows, and along roadsides in the northern half of the United States, is described. Its distribution and uses are given. Eradication and control measures are discussed.—*L. R. Hesler*.

22. HANSEN, ALBERT A. **The hawkweeds or paintbrushes.** U. S. Dept. Agric. Dept. Circ. 130. 3-7. *Fig. 1-2.* 1920.—Three noxious hawkweeds are described, namely, orange hawkweed (*Hieracium aurantiacum*), king-devil (*H. florentinum*), and yellow field hawkweed (*H. pratense*). Eradication and precautionary measures are given.—*L. R. Hesler*.

23. HAYWOOD, A. H. **Saccaline at Wollongbar experiment farm.** Agric. Gaz. New South Wales 29: 886-887. *1 fig.* 1918.—Saccaline, recently introduced from Victoria, is a local name for a strain of sweet sorghum (*Andropogon sorghum*), which seems to have developed perennial habits. It attains a height of 12 feet, stools well, matures seed freely, has the ratooning habit and is considered more valuable than other sorghums. One grower is said to have obtained 9 cuttings. Chemical analysis is given.—*L. R. Waldron*.

24. HEADLEY, F. B. **The work of the Newlands Reclamation Experiment Farm in 1919.** U. S. Dept. Agric. Dept. Circ. 136. 3-21. *Fig. 1-3.* 1920.—The report gives yields and market value of alfalfa, barley, oats, wheat, potatoes, hay, pasture, garden and miscellaneous crops; variety tests of wheat, barley, and potatoes; tests of horticultural crops, including tomatoes and sweet corn; blossoming date for varieties of apples, pears, plums, and prunes; and concludes with an account of experiments made in the reclamation of alkali soil.—*L. R. Hesler*.

25. IVERSEN, K. **Lokale Markforsøg i Danmark.** [Local field experiments in Denmark.] Nordisk Jordbrugsforskning (København) 1920: 102-120. 1920.—The author summarizes and discusses experiments carried on with fertilizers, high yielding strains, seed disinfection and potato sprayings by a large number of local experimenters and by farmers' unions during the years 1893-1919. The increased crop yields are compared with the amount of artificial fertilizers applied and with the varying costs of the fertilizers and treatments.—*Ernst Gram*.

26. JOHNSON, E. **Behavior of inoculated leguminous seed.** Monthly Bull. Dept. Agric. California 9: 31-36. 1920.—Nitrogen-fixing bacteria exist in several forms, i.e., bacteria from certain legumes will not inoculate certain other legumes. Legumes are divided into 14 groups. The organisms from the nodules of any legume can inoculate any other legume within the same group only. In the field, the organisms can withstand any degree of acidity or alkalinity that the corresponding legume can endure. Inoculation does not render the plant immune to any of the diseases to which it is susceptible, does not increase its resistance to frost, sunburn, alkali, acidity, drought or excess moisture, and does not in any way alter its habit of growth.—*E. L. Overholser*.

27. KELBERGER, L. RITTER, UND F. SCHONHEIT. **Welche Leistungen können wir vom Anbaheimischer Sommerölfrüchte erwarten.** [What result may we expect from the culture of domestic summer oil plants.] Mitteil. Deutsch. Landw. Ges. 35: 705-713. 1920.—A general paper on the culture of oil producing plants, such as mustard and rape, together with tables giving the results of tests.—*A. L. Pieters*.

28. KERLE, W. D. Farmers' experiment plots. Maize experiments, 1919-20. Upper north coast district. Agric. Gaz. New South Wales 31: 875-881. 1920.—Experiments were conducted on various private farms in the district. In variety trials of maize a maximum yield of 85 bushels per acre was secured from Improved Yellow Dent. The maximum net gain secured by using mineral manures amounted to 25 bushels, or \$43.25 per acre. With but one exception, the use of mineral manures showed net gains over land receiving no manure at all.—*L. R. Waldron.*

29. KUO, TAN HSIEN. A plan for cotton improvement at the Chinese Cotton Mill Owners Association. Hua-Shang-Sha-Chang-Lien-Ho-Hui-Ki-Kau [China Cotton Jour.] 13: 4-8. 1920.—A plan is outlined for the establishment of cotton breeding experiment stations, the organization of scientific departments and staffs, and the nature of the contemplated work, with the object of increasing the yield and quality of cotton in China. A five-year program for proposed projects in cotton breeding is also given.—*Chunjen C. Chen.*

30. KUO, TAN HSIEN. [Translation of: TODD, JOHN A. The world's cotton crops. A. and C. Black: London, 1914.] Hua-Shang-Sha-Chang-Lien-Ho-Hui-Ki-Kau [China Cotton Jour.] 14: 206-228. 1920.

31. LAUDER. The electrical treatment of seeds. Scottish Jour. Agric. 3: 340-344. 1920.—Reports of farmers and some early field tests support the claims of the originators of the WOLFRYN process as to greater returns from treated seed. Subsequent tests more carefully made show no such advantage. Treating oats was found unprofitable by A. F. WILSON in West Lothian and by JOHN WALKER in Berwickshire and Roxburghshire. MARTIN H. F. SUTTON at Reading compared yields and germinations in seeds of carrots, swedes, cabbages, and mangolds. In each case treated seed was compared with untreated, and with seeds immersed in solutions of salt and sulphate of ammonia. All yield differences were within the limits of experimental error.—*H. V. Harlan.*

32. LEMMERMAN, O. Ueber die Kohlensäureernährung der Pflanzen. [On the carbonic acid nutrition of plants.] Mitteil. Deutsch. Landw. Ges. 35: 696-699. 1920.—The author refers to BORNEMANN's theory (see Bot. Absts. 8, Entry 12) that stable and green manures evolve CO₂ and that this stimulates growth, and shows that his experiments give no support to the Bornemann theory. He found that the air over pots of soil liberally supplied with organic material contained very small amounts of CO₂ but that the air drawn through such pots contained quantities of CO₂ approaching the theoretical maxima from the organic material applied. Pot and field experiments were conducted in various ways but in no case was there a larger crop that could be attributed to an increase in the CO₂ content of the air.—*A. J. Pieters.*

33. LOMANITZ, S. The oil of the prickly pear seed. Jour. Indust. Eng. Chem. 12: 1174-1175. 1920.—The oil apparently falls into the group of semi-drying oils, and if produced in sufficient quantities might be used in some of the oil-products industries.—*Henry Schmitz.*

34. MCCAULEY, C., AND L. G. LITTLE. Ploughing experiments at Cowra and Nyngan. Agric. Gaz. New South Wales 31: 837-840. 1920.—Wheat was grown on land plowed shallow, medium, and deep, by disc and mold board plows, and also upon sub-soiled land. In no case was the more expensive treatment decisively favorable and at Nyngan, particularly, the cheaper methods gave best results.—*L. R. Waldron.*

35. McDONALD, A. H. E. The saving of seed wheat. Agric. Gaz. New South Wales 31: 841-842. 1920.—Suggestions are offered in regard to distribution of proper wheat varieties, following drouth conditions.—*L. R. Waldron.*

36. MAIDEN, J. H. Chats about the prickly pear. No. 7. Agric. Gaz. New South Wales 31: 889-893. 1920.—Use and value of different exterminators of prickly pear (*Opuntia* spp.) are discussed, including arsenite of soda and arsenious chloride. Literature is cited.—*L. R. Waldron.*

37. MAKIN, R. N. Some recently introduced fodder plants. Agric. Gaz. New South Wales 31: 873-874. 1920.—Brief cultural notes are given on Sudan grass, elephant grass (*Pennisetum purpureum*), and saccaline (*Andropogon sorghum*).—L. R. Waldron.

38. MATERNAERS, F. F. Der Grubensilo und der Schanzensilo. [The pit silo and the tank silo.] Mitteil. Deutsch. Landw. Ges. 35: 673-679. 1920.—Detailed descriptions, with diagrams, of methods of constructing the pit and the tank silo.—A. J. Pieters.

39. NEWHALL, C. A. The direct identification of soy-bean oil. Jour. Indust. Eng. Chem. 12: 1174-1175. 1920.—A method of identification of soy-bean oil involving the use of uranium acetate or uranium nitrate is discussed.—Henry Schmitz.

40. OEERSTEIN. Ueber einige seltenere Luzerne und Wollklettenbeischlüsse. [Concerning some rare lucerne and woolcombing enclosures.] Landw. Jahrb. 53: 627-637. 1919.—The author describes some impurities and adulterants found in lucerne seed which appear to indicate the source as Persia and Asia Minor. The seeds secured from wool combings proved to be those of *Medicago denticulata* and *M. maculata*.—A. J. Pieters.

41. PARDY, ALEXANDER. Broadcasting versus drilling oats. Scottish Jour. Agric. 3: 232-236. 1920.—In a 4-year test in northern Scotland the high yields of grain were obtained by 4 different methods of seeding, in the following order: cross drilled, broadcast and drilled, broadcast, and single drilled. The total average difference was less than 3 bushels. In seeding, 6 bushels were used on the drilled plots, 7 on the plot drilled and broadcast, and 8 on the broadcast plot.—H. V. Harlan.

42. PIUTTI, A. Sur l'action de la chloropicrine sur les parasites du ble et sur les rats. [The effect of chloropicrine on the parasites of wheat and on rats.] Compt. Rend. Acad. Sci. Paris 170: 854-856. 1920.—Results are given of experiments in the use of chloropicrine as an insecticide for wheat. The seed was treated with a dose of 10 cc. per cubic meter. The loss in percentage of germination was found to be 30. Flour and bread made from seed treated in this way showed no deleterious effect.—C. H. Farr.

43. RØRDAM, K. Undersøgelse af olieholdige Frø af en ukendt Plante. [An unknown plant with oil-containing seed.] K. Veterinaer og Landbohøjskole Aarskr. 1920: 36-42. 1920.—An undetermined rape hybrid, seed of which was found as a contamination in Russian flax seed, upon analysis proved to have about the same chemical composition as rape seed, and is being taken up for comparative experiments at the state experiment stations.—Ernst Gram.

44. SHEAR, W. V. How certified seed potatoes will benefit the California potato industry. Monthly Bull. Dept. Agric. California 9: 375-381. 1920.

45. SYMON, J. A. The turnip crop of Scotland. Scottish Jour. Agric. 3: 26-35. 1920.—In 1919 turnips were grown on 426,251 acres of the 3,408,479 acres of arable land in Scotland. For sanitary reasons turnips are grown in 5, 6, or 7-year rotations. The largest seeds produced the largest plants. The seed is drilled in ridges 28 inches apart. Seeding should be completed before May 25. Phosphorus is the most important fertilizer for the turnip crop.—H. V. Harlan.

46. THOMPSON, H. C. The manufacture and use of peanut butter. U. S. Dept. Agric. Dept. Circ. 128. 3-16. Fig. 1-6. 1920.

47. TUNG, SHIH CHIN. [Kaoliang and breeding.] (Text in Chinese.) Khu-Shou [Science-Publ. Chinese Sci. Soc.] 5: 712-716. 1920.—A general discussion is presented of *Andropogon sorghum* varieties *obovata*, *saccharatus* and *vulgare* regarding root systems, drought resistance, relations to soil, self-fertilization and cross-fertilization, poisonous content, and adaptability to all kinds of soil. Methods of producing pure seeds from desirable plants and methods of cross-pollination are described. The head-to-row system of individual

selection is also outlined. The important factors to be considered in making selections in kaoliang breeding are: Sugar content, earliness, disease resistance, drought resistance, productiveness, erectness, and shape.—*Chunjen C. Chen.*

48. VENDELMANN, HENRY. **Reclamation of waste land.** *Scottish Jour. Agric.* 3: 319-328. 1920.—Waste land is reclaimed in South England and Belgium for agriculture, forestry, and fisheries. Winter wheat, spring oats, turnips, rape, buckwheat, and potatoes are favorite first crops. Pine, larch, spruce, and poplar are more commonly used in tree plantings. Where fish are grown in shallow ponds, which are drained and cultivated every third year, an unusual rotation of fish and oats occurs.—*H. V. Harlan.*

49. WALSTER, H. L. **Earliness and rustiness of spring wheats.** *North Dakota Agric. Exp. Sta. Bull.* 143. 8 p., 1 fig. 1920.—Yields of varieties Red Bobs, Prefude, Ruby, Kitchener, Pioneer, and Marquis are given and also amounts of stem rust (*Puccinia graminis*) occurring on each in different years. Marquis has given best yields.—*L. R. Waldron.*

50. WATSON, ROBERT. **Agriculture in Orkney.** *Scottish Jour. Agric.* 3: 306-315. 1920.—Early maturing and non-shattering varieties of oats and barley are grown, also grasses and white and red clovers. The Sandy variety of oats and 6-rowed barley, which are early maturing and non-shattering, are grown. The "Up-to-date," Abundance, and British Queen varieties of potatoes are cultivated.—*H. V. Harlan.*

51. WENHOLZ, H. **Pigeon pea (*Cajanus indicus*).** *Agric. Gaz. New South Wales* 31: 888. 1920.—Cultural notes are given.—*L. R. Waldron.*

52. WILLIAMS, CHARLES BURGESS, AND DANIEL HARVEY HILL. **Corn book for young folk.** 250 p., 186 fig. Ginn and Company: Boston, 1920.—This book, which is designed to interest and enlighten the very young agriculturists of the country, relates the story of corn and its culture in a simple, readable style. At the conclusion of each chapter the important facts contained therein are brought out by questions.—*C. V. Piper.*

53. YEH, YUEN TING. [Standard varieties of American cotton and selection.] *Hua-Shang-Sha-Chang-Lien-Ho-Hui-Ki-Kau [China Cotton Jour.]* 14: 235-245. 1920.—Methods are discussed and described of maintaining the purity of cotton varieties developed by the U. S. Department of Agriculture through selection. Outlines of 5-year system in mass selection and 7-year system in progeny selection for use in China are given. A descriptive table is given of the characteristics of Acala, Columbia, Durango, King, Lone Star, and Trice.—*Chunjen C. Chen.*

54. YEH, YUEN TING. [A study of cotton production in China.] *Hua-Shang-Sha-Chang-Lien-Ho-Hui-Ki-Kau [China Cotton Jour.]* 12: 233-241; 13: 221-236. 1920.—The author reports a two months' investigation of the Chinese cotton-growing situation made in the summer of 1919 with Mr. O. F. Cook, U. S. Department of Agriculture. Nine provinces were surveyed: Kiangsu, Chekiang, Anhwei, Shantung, Chihli, Honan, Hunan, Hupeh, and Kiangsi. The climate of the northern part of the region is dry, while the southern part is wet. The soils vary from heavy clays to sandy loams. Mass planting is the common practise, though row-planting is used to some extent. American varieties are quite common throughout the region. Chinese cotton is of two kinds, brown and white. American cotton consists mostly of the following varieties distributed by the U. S. Department of Agriculture: Lone Star, Trice, King, Acala, Durango, Columbia, Egyptian, and Sea Island. A species of Chinese Upland cotton was observed but no record of its origin was found. The provinces of Chihli, Honan, Shansi, Shensi, and Shantung are said to be suited to growing American cotton. The following cotton insects were observed: Bollworm, pinkworm, leaf-hopper, red spider, cutworm, and cotton caterpillar. Diseases noted were anthracnose, rust, shedding of bolls, angular leaf spot, and damping-off. Five governmental cotton stations and 9 private stations visited by the author are listed. Suggestions for improving Chinese cotton are given: (1) Careful selection and variety test; (2) close planting and late chopping; (3) deep plowing and frequent cultivating; (4) better drainage in the southern region; and (5) Trice is considered to be adaptable in China.—*Chunjen C. Chen.*

BIBLIOGRAPHY, BIOGRAPHY AND HISTORY

NEIL E. STEVENS, *Editor*

(See also in this issue Entries 15, 17, 162, 163, 165, 192, 324, 377, 687, 692, 737, 744)

55. ANONYMOUS. International catalogue of scientific literature. *Nature* 106: 195-196. 1920.—Review of the history of the catalogue and of a conference to consider its continuation.—O. A. Stevens.

56. ANONYMOUS. Some new botanical memoirs. *Sci. Prog.* [London] 14: 644-645. 1920.—The appearance of a new botanical publication entitled "Botanical Memoirs" initiated and edited by A. H. CHURCH, Botany School, Oxford, is noted.—J. L. Weimer.

57. ANONYMOUS. Texas Pecan Growers Association organized. *Amer. Nut Jour.* 12: 86-87. 1920.

58. ANONYMOUS. [Rev. of: GEDDES. The life and work of Jagadis C. Bose.] *Jour. Botany* 58: 299. 1920.

59. BASTIAN, W. The origin of life: The work of the late Dr. Charlton Bastian, F.R.S. *Sci. Prog.* [London] 14: 461-462. 1920.—Dr. Bastian believed that living matter is constantly coming into being in suitable environment, a process which he termed "archebiosis." He claimed to have brought about the *de novo* origin of definite well-known living organisms from certain colloidal saline solutions enclosed within hermetically sealed and sterilized glass tubes.—J. L. Weimer.

60. BRAGG, LAURA M. Contributions toward a history of science in South Carolina. I.—Henry W. Ravenel, LL.D.—*Charleston Mus. Bull.* 16: 17-23. 1920.—Twelve specimens of Ravenel's fungi recently added to the museum herbarium are listed, and several interesting letters to Professor LEWIS R. GIBBES of Charleston are reproduced.—Neil E. Stevens.

61. BRITTEN, JAMES. Bibliographical notes, LXXIXa, Lehmann's Pugillus, I. *Jour. Botany* 58: 292-293. 1920.—Corrections are here made of a previous paper on the same subject (*Jour. Botany* 58: 108).—The inspection of an original issue of No. 1 at Kew showed the author to be in error in ascribing the original description of 8 species of cacti to Nov. Acta instead of to the Pugilli. Other slight errors are pointed out.—K. M. Wiegand.

62. B[ITTEN], J[AMES]. John Reader Jackson. *Jour. Botany* 58: 298. 1920.—A biographical sketch of J. R. Jackson (1837-1920) for 43 years Curator of the Kew Museums.—K. M. Wiegand.

63. BRITTON, N. L. Report by the Director-in-Chief upon a visit to botanical institutions in England. *Jour. New York Bot. Gard.* 21: 197-208. 1920.—Information is presented on the plant collections, botanical research, and personnel at Kew and elsewhere.—H. A. Gleason.

64. CONDIT, I. J. Bits of fig history in California. *Monthly Bull. Dept. Agric. California* 8: 260-265. 1919.

65. DEWITZ, J. Die Immunsande. Zusammenstellung der Literatur über die für die Reblaus immunen Sande. [Immune soils. A bringing together of the literature concerning the soils immune to Phylloxera.] *Landw. Jahrb.* 35: 435-484. 1919.—The author calls attention to the fact that it has long been known that Phylloxera can not live in certain soils. The literature is, however, old and inaccessible, so the author has brought this together in the above paper.—A. J. Pieters.

66. DORPH-PETERSEN, K. Frederik Kølpin Ravn. *Nat. Verden* [København] 4: 289-301. *Portrait.* 1920.—A scientific and personal appreciation.—Ernst Gram.

67. FAWCETT, W. William Harris. Jour. Botany 58: 298-299. 1920.—A short biographical sketch of William Harris (1860-1920), best known for botanical exploration in Jamaica.—K. M. Wiegand.

68. FERDINANDSEN, C. F. Kølpin Ravn. Nordisk Jordbrugsforskning [København] 1920: 137-142. Portrait. 1920.—An account of the life and work of Professor Ravn (1873-1920) by his successor.—Ernst Gram.

69. RAVN, F. KØLPIN. Experiments in plant culture in Denmark. Scottish Jour. Agric. 3: 207-214. 1920.—There are 8 state experimental stations dealing with agricultural problems and 3 with horticultural problems. Plant improvement has made remarkable progress especially in root crops and forage plants. New strains originated by institutions and individuals are tested in open competition by the state experiment station and the results determine the market demand for the seed.—H. V. Harlan.

70. RAVN, F. KØLPIN. Praktisk Erfaring og videnskabelig Forskning i Plantepatologiens Historie. [Practical experience and scientific research in history of phytopathology.] Nat. Verden [København] 4: 302-316. 1920.—A demonstration of coöperation in the development of seed disinfection, protectional spraying, frost control, and report service.—Ernst Gram.

71. ROSIN, JOSEPH. Arthur Meyer. Jour. Amer. Pharm. Assoc. 9: 851. Portrait. 1920.—A brief sketch of the life and botanical activities of Arthur Meyer.—Anton Hogstad, Jr.

72. SALISBURY, E. J. [Rev. of: BOWER, F. O. Joseph Dalton Hooker. 62 p. Society for Promoting Christian Knowledge: London, 1919.] Sci. Prog. [London] 14: 692. 1920.

73. STEVENS, F. L. Changes of a decade in plant pathology. [Abstract.] Phytopath. 10: 65. 1920.

74. TROOST, D. Overzicht van de in ons land verbouwde tarwerassen. [Review of cultivated wheat races in our country.] Cultura 32: 226-244. 1920.—The occurrence of wheat varieties in the Netherlands is chronologically divided into the periods 1806-40, 1840-65, 1865-1900, and after 1900. Polish wheat (*Triticum polonicum*) was well known at the beginning of the nineteenth century. In 1826 in the province of Sealand, Russian was grown for the first time, and in 1834 came Giant, also known as Syrian wheat (*T. turgidum*). In 1835 the price of wheat declined in Friesland and Groningen, consequently wheat raising diminished, but with higher prices in 1839 more wheat was grown. Red wheat then became more common, and Zeeuwsche (Sealand) wheat came into favor. In 1840 the Whittington was introduced, originally found in Switzerland by Whittington. Chiddam was grown from about 1850, and Zeeuwsche wheat was more largely cultivated. From 1865 to 1900 many English varieties were introduced, such as Squarehead, Prolific, Rough Chaff, Essex, Victoria, and others, most being of excellent quality though some were not sufficiently resistant to frost. A variety of Polish wheat has been raised since 1870, and the Dikkop (thick-head), discovered in a field with English wheat in 1865, is still to be found. In 1886 reciprocal crosses were made by BROEKEMA between Zeeuwsche and Squarehead, from which originated Duivendal and Spijk, both of good quality. MANSOLT obtained the Fletumer wheat, which because of its hardness was of much value in the northern province of Groningen. In 1889 Broekema again crossed Squarehead with Zeeuwsche, obtaining an excellent strain, which in 1901 was called Wilhelmina, at present the leading variety. Other good varieties of late years are Millioen and Imperial, from which was derived the improved strain Imperial II a.—J. C. Th. Uphof.

75. WARNER, MARJORIE F. Bibliographical Notes, LXXXII. The dates of Rheede's "Hortus Malabaricus." Jour. Botany 58: 291-292. 1920.—The date of part 4 is shown to be 1683 instead of 1673. The diversity in title pages of the various volumes of this work, and even between corresponding volumes of different sets is noted, and readers are requested to make public information which supports any date earlier than 1678 for the first volume.—K. M. Wiegand.

76. WHETZEL, H. H. Institute for plant protection. Sci. Amer. Monthly 2: 174-175. 1920.

BOTANICAL EDUCATION

C. STUART GAGER, *Editor*ALFRED GUNDERSEN, *Assistant Editor*

(See also in this issue Entries 8, 167, 286, 606)

77. ANONYMOUS. [Rev. of: CRABTREE, J. H. *Grasses and how to identify them.* 64 p. The Epworth Press: London (no date).] *Nature* 105: 805. 1920.

78. ANONYMOUS. [Rev. of: ELLIS, G. S. M. *Applied botany.* viii + 248 p., 67 illus., 2 maps. Hodder & Stoughton: London, 1919.] *Sci. Prog.* [London] 14: 692-693. 1920.

79. ANONYMOUS. [Rev. of: MARTIN, J. N. *Botany for agricultural students.* x + 585 p. John Wiley & Sons: New York; Chapman & Hall: London; 1919.] *Sci. Prog.* [London] 14: 512-513. 1920.

80. ANONYMOUS. [Rev. of: PETERS, C. A. *The preparation of substances important in agriculture: A laboratory manual of synthetic agricultural chemistry.* 3rd ed., vi + 81 p. Chapman & Hall: London; John Wiley & Sons: New York; 1919.] *Sci. Prog.* [London] 14: 513. 1920.

81. ANONYMOUS. [Rev. of: WILLIS, J. C. *A dictionary of the flowering plants and ferns.* 4th ed., lxvii + 712 p., 41 fig. Cambridge University Press: 1919.] *Sci. Prog.* [London] 14: 508-509. 1920.

82. BERRY, JAMES B. *Vocational forestry education.* *Jour. Forestry* 18: 730-731. 1920.

83. DAVIS, BRADLEY M. *Introductory courses in botany.* V. *School Sci. and Math.* 20: 692-696. 1920.

84. HARRIS, G. W. *Experimental farming.* *Sci. Prog.* [London] 14: 458-461. 1920.—The writer feels that before the agricultural scientist can be of the greatest assistance to the farmer he must become more familiar with the practical problems of farm life.—*J. L. Weimer.*

85. KÜSTER, ERNST. *Lehrbuch der Botanik für Mediziner.* [Text-book of botany for medical students.] 420 p., 28 fig. (some colored). F. C. W. Vogel: Leipzig, 1920. [Price of volume, unbound, 85 M; bound, 100 M.]—The first 57 pages are devoted to the gross morphology of cryptogams and phanerogams, with emphasis on the latter. Anatomy is treated in the following 44 pages, about equal space being given to cell study (cytology) and tissue study (histology). Physiology occupies 75 pages, reproductive processes in phanerogams and cryptogams as well as variability, inheritance, mutation, etc., being included in this chapter. Thirty pages are devoted to "plant chemistry," the latter treated under 15 heads according to the nature of the compounds treated. Pathology occupies 35 pages, about half devoted to physiological disturbances not due to parasites (discussed under 9 heads) and half to plant diseases due to parasites, about equal space being given to plant and animal parasites.—The second part of the book (150 pages) is entitled special, or systematic, botany. The entire plant kingdom is treated, the enumerated forms, however, being almost exclusively those of practical importance as sources of food, drugs, poisons, raw products of use in industry, and the like.—All parts of the book are profusely illustrated. An extensive 20-page subject index is included.—*J. R. Schramm.*

86. LANE-POOLE, C. E. *Professional forestry education.* *Australian Forest. Jour.* 3: 217-223. 1920.—A paper read at the Hobart Forestry Conference. The author advances argument for the establishment of a federal forestry school organized along the lines of the French school at Nancy, considered the best of its kind in Europe. The curriculum, faculty, terms, fees, and certain other details of organization are discussed. New South Wales, on

account of the great diversity of its forest conditions, is suggested as the most desirable state in Australia for the school.—*C. F. Korstian*.

87. SUN, EN LIN. [A summer course in cotton-growing at the Nanking Teachers' College.] *Hua-Shang-Sha-Chang-Lien-Ho-Hui-Ki-Kau* [China Cotton Jour.] 21: 218-223. 1920.—The program is outlined of a 6-week course designed to give the student a fundamental knowledge of cultural methods and breeding technique of the cotton crop. A list of the members of the instructing staff and a curriculum are also given.—*Chunjen C. Chen*.

CYTOLOGY

GILBERT M. SMITH, *Editor*

GEORGE S. BRYAN, *Assistant Editor*

(See in this issue Entries 221, 254, 273, 292, 328, 330, 333, 342, 442, 605)

ECOLOGY AND PLANT GEOGRAPHY

H. C. COWLES, *Editor*

G. D. FULLER, *Assistant Editor*

(See also in this issue Entries 1, 168, 182, 395, 432, 437, 442, 453, 585, 683, 684, 686, 687, 689, 692, 695, 696, 701, 702, 703, 708, 719, 720, 727, 728, 730, 732, 735, 739, 744)

GENERAL, FACTORS, MEASUREMENTS

88. BRADSHAW, R. V. Color variations in flowers. *Amer. Bot.* 26: 23, 24. 1920.—Additions to the list of flowers with varying color published in *American Botanist* for Aug. 1919.—*W. N. Clute*.

89. HAUGH, L. A. Klimaets Indflydelse Paa Udviklingen af Bogens Sommerskud. [Influence of climate on the development of summer growth of beech.] *Dansk. Skovforenings Tidsskr.* 4: 13-28. *Fig. 4*. 1919.

90. LE PLASTRIER, G. M. Notes on loranths from Wagga district. *Australian Nat.* 4: 139. 1920.—It is observed that the mistletoes of the region grow on hosts having leaves of a form similar to those of the parasite; thus they are hard to detect.—*T. C. Frye*.

91. PORSILD, A. E. Sur le poids et les dimensions des graines arctiques. [On the weight and dimensions of arctic seeds.] *Rev. Gén. Bot.* [Paris] 32: 97-120. 1920.—Contrary to the thesis of SCHUEBELER, author finds after many determinations and comparisons that seeds of plants grown in arctic regions (Greenland) are relatively lighter than those of the same or related species grown in alpine or temperate regions.—*L. W. Sharp*.

92. WHERRY, EDGAR T. Soil tests of Ericaceae and other reaction-sensitive families in northern Vermont and New Hampshire. *Rhodora* 22: 33-49. 1920.—A record of field experiments carried out by the author to determine the acidity and the alkalinity of soils in which several species of the Ericaceae and some other plants were growing. The determinations were made by indicators in the field according to a method recently described by the author (*Jour. Wash. Acad. Sci.* 10: April, 1920). The studies were made during June, 1919, in a variety of mountain, bog, and swamp areas in New Hampshire and Vermont, each of which is described. The general and local soil conditions in each are given, together with lists of plants found. All of the Ericaceae, with one exception (*Pyrola asarifolia* Michx.), were found in soils giving an acid reaction, although the members of the subfamily Pyroloideae, when compared with members of the other subfamilies, grew more abundantly in soils of rather low specific acidity. The exceptional species, *P. asarifolia*, was found only in neu-

tral soils. Among the Orchidaceae, the northern species seemed to attain their greatest development in circumneutral soils, i.e., neutral or only weakly acid or alkaline soils, while most of the southern species apparently preferred more acid soils.—The paper concludes with a list of plants studied, other than those of the above two families, which proved to be oxyphytes, and a list of those which were found to be calcicoles.—James P. Poole.

93. WHERRY, EDGAR T. The soil reactions of certain rock ferns—I. Amer. Fern Jour. 10: 15-22. 1920.—The author gives a table, "Classification of Rock Ferns on the Basis of Soil Reaction," listing 7 acid soil plants and 18 calcareous soil plants. He then discusses 7 individual species representing 4 genera.—F. C. Anderson.

STRUCTURE, BEHAVIOR

94. JAKUES, H. E. Some phenological records of spring flowering plants of Henry County. Proc. Iowa Acad. Sci. 25: 413-415. Fig. 162. 1920.—Dates of first flowering of twenty species appearing in March, April, and May, 1915-1918, at Mt. Pleasant, Iowa, are shown in a table. Six species are shown on a graph. In 1916 *Acer saccharinum*, *Phlox divaricata*, and *Berberis vulgaris* bloomed later than in any other year. But *Sanguinaria canadensis* and *Acer negundo* bloomed latest in 1917.—H. S. Conard.

95. SCHMIDT, WILHELM. Die Verbreitung von Früchten durch die Luftbewegung. [The distribution of seeds by air currents.] Naturwissenschaften 7: 810-812. 1919.—Formulae are developed whereby the distances to which winged seeds and pollen may be carried by the wind can be determined.—Orton L. Clark.

96. STEVENS, O. A. Notes on species of *Halictus* visiting evening flowers (Hyn.). Entomol. News 31: 35-44. 1920.—Some observations on four species of bees visiting evening flowers, particularly primroses, are recorded. One species is new; this one and two others are especially adapted to collecting pollen from the Onagraceae, due to a sparseness of the scopula which makes possible the adhesion of the pollen mass. Observations on the opening of the flowers and the visits of the bees are recorded for *Megaptermium missouriense*, *Allionia hirsuta*, *Onagra strigosa*, *Anogra pallida*, and *Gaura coccinea*. These bees fly about the flower buds before any sign of opening is visible; at the first small opening they force their way in, one or two visits stripping the flower of its pollen mass. A group of *Onagra* plants observed at intervals showed that most of the flowers open at 9:00 p.m., although some were found to open later in the evening.—Wanda Weniger.

97. WEAVER, J. E. The ecological relations of roots. Carnegie Inst. Washington Publ. 286. 128 p., 30 pl., 58 fig. 1919.—The root habits of about 140 species of dominant and subdominant shrubby and herbaceous plants occurring under a wide range of environmental conditions and studied in the field are described and in part figured by habit photographs and root maps. The communities represented in the research include the chaparral of southeastern Nebraska, the prairies of eastern Nebraska and of southeastern Washington, "the plains association and sandhill subclimax of Colorado, and the gravel-slide, half-gravel-slide, and forest communities of the Rocky Mountains of Colorado." With the description of the root systems of each community is given an account of the temperature, precipitation, evaporation, wind movements, and notes on the soil conditions, including the moisture content.—In the prairies of eastern Nebraska more than half of the plants studied have roots which penetrate to a depth exceeding 5 feet, with a maximum penetration of 13-20 feet. The roots exhibit a condition of layering with accompanying reduction of competition of contiguous species for soil moisture. The soil is loess and glacial drift, and the water content of the upper 4-5 feet may be so reduced that none is available for plant growth. About 71 per cent of the rainfall occurs during the growing season. The mean summer temperatures are high and the mean humidity is often low. The wind averages about 70 miles per day.—The plants of the prairie community of southeastern Washington are not so deeply rooted as are those of the Nebraskan prairies. Out of a total precipitation of 21 inches annu-

ally only about one-third occurs during the season of growth. Sometimes the water content of the soil to a depth of 3 or 4 feet is reduced to the point where it is not available for plant growth. Roots penetrate more deeply in loess than in glacial drift soils. Aeration may also be a factor of importance in these differences in root penetration.—The chaparral community, between the Ohio-Missouri forest complex and the prairies to the westward, have plants with well developed absorbing systems. The roots penetrate to a depth of 5.5 to 21 feet, but all are deeply placed. Vegetative propagation is a feature in this community.—In the plains the plants are more deeply rooted than in the prairies although the extreme depth attained in certain instances was found to be less. The generalized type of root system is most common. The precipitation is about 15 inches, 80 per cent of which falls during the season of growth. Water does not penetrate to a depth greater than 13 feet, or that marking the deepest placing of the roots. The prominence of shallow, widely spreading laterals is a feature of certain species, as in the cacti and in *Yucca*. At certain periods during the summer no water is available in the soil for plants to a depth of 5 feet, and it is uniformly dry to a depth of 7 feet. The subaerial plains environment is characterized by active wind movements, great daily fluctuations in air temperature, and relatively high evaporation throughout the growing season.—In the sandhills the roots are various, although long, widely spreading roots in the upper soil stratum, within 2 feet of the surface, are possessed by nearly all of the species studied. Several plants which develop deep roots in the plains have only shallow roots in the sandhills. The subaerial environmental conditions are similar to those of the plains and differences in root development are attributable to edaphic causes. The upper 2-3 feet of soil carry more moisture than the deeper soil. The most extensive root system of any seen, that of *Ipomoea leptophylla*, was found in this community.—In the gravel-slide community the roots of all plants are shallowly placed, few lying below a depth 1.5-2 feet. This is related to the frequent summer showers of little penetration. The roots in the half-gravel-slide are shallowly placed, as in the gravel-slide, but also supplementary deep roots are developed. This is related to more favorable deep-soil conditions. Intense shallow-root competition occurs in the half-gravel-slide. Reliance on water of the deeper soils, a feature of this community, carries the plants over periods of drought.—In the forest a relatively shallow-rooted condition is to be found and this is true of many trees as well as of lesser plants. This characteristic is related to the distribution of moisture in the soil, which is most abundant in the surface layers. The roots also have relatively poor lateral development.—Where species occur in distinctly different habitats the root development generally conforms to the community root type, although exceptions were found in a few instances.—*W. A. Cannon.*

98. WEAVER, J. E. Ecological relations of roots. [Abstract.] Publ. Nebraska Acad. Sci. 10: 15-16. 1920.—See Bot. Absts. 8, Entry 97.

VEGETATION

99. ANDERSEN, EMMA N., AND ELDA R. WALKER. An ecological study of the algae of some sandhill lakes. Trans. Amer. Microsc. Soc. 39: 51-84. Pl. 3-12, fig. 1-17. 1920.—This study was made in Cherry county, western Nebraska, in the sandhill country abounding in bodies of water. The latter vary in size from mere ponds to lakes 3 or 4 square miles in area, and in depth from 2 to 15 feet. The lakes are surrounded by grassy meadows and sand dunes. The climate is dry, windy, hot in summer and cold in winter. By analysis the water of the different lakes varies in alkalinity from 111 to 1129 parts per million. Many migratory birds visit the lakes, probably bringing the spores of many algae on their feet.—The work was limited to a few localities representative of the different types of habitat of the region. Climatic conditions—daily variations of temperature of air and water at different depths—were obtained by use of standard instruments. For the study of light intensity at different depths a modification of the solio photometer was used.—The lakes were found of fairly uniform temperature, aeration, and alkalinity. Two factors influence the distribution of algae, light and mechanical support. Nine lakes were studied, and lists of algae found in early summer, midsummer, and in October are given. It is concluded that the occurrence of algae in a given body of water is due largely to seasonal periodicity, mineral and gas content of the water, and light intensity.—*S. H. Essary.*

100. HAYDEN, ADA. Notes on the floristic features of a prairie province in central Iowa. Proc. Iowa Acad. Sci. 25: 369-389. Fig. 145-161. 1920.—The area shows four formations: upland prairie, meadow, swamp, and pond, with several consocieties. Lists of plants of each consocieties are given, with some notes on soils. Reversion takes place slowly and is rare. Evidence of invasion of the prairie by forest in ravines or on moist slopes is not uncommon. The figures are photographs of typical plant groups and habitats.—H. S. Conard.

101. KASHYAP, S. R. Note on the floating islands of Riwalsar. Jour. Indian Bot. 1: 252-253. 1920.—In Mundi State in the outer north-west Himalayas there is a small lake in which are 7 floating islands, formed almost exclusively of *Phragmites*, probably *P. communis*. A detailed study of the islands was not made.—Winfield Dudgeon.

102. LOWE, C. W. The flora of Warrens Landing, Lake Winnipeg, Manitoba. Canadian Field-Nat. 34: 26-30. 1920.—Warrens Landing possesses a typical muskeg covered with the coniferous trees *Picea alba*, *P. mariana*, and deciduous trees, especially poplars, willows, and birch. There is a dense shrubby undergrowth in which are many of the flowering plants typical of the North. A list of the plants found at Warrens Landing, arranged in taxonomic sequence, accompanies the ecological notes.—W. H. Emig.

103. MOORE, G. T., AND J. L. KARRER. A subterranean algal flora. Ann. Missouri Bot. Gard. 6: 281-307. 1919.—Results are reported on algal cultures prepared by inoculating sterile portions of a modified Beyerinck solution on sand with soil taken from various depths down to 1 m. Various types of soils used were from Missouri, Massachusetts, and California. It was found that "there exists a subterranean algal flora independent of the nature of the soil and locality." *Protoderma viride*, it would seem, is "especially adapted to live under subterranean conditions;" however, 13 other algae were found at a depth of at least 20 cm. "The greatest growth was never at the surface but at a depth of 5-60 cm." A detailed physiological study of *Protoderma viride* is forthcoming.—S. M. Zeller.

104. NICHOLS, GEORGE E. The vegetation of Connecticut. VI. The plant associations of eroding areas along the seacoast. Bull. Torrey Bot. Club 47: 89-117. Fig. 1-6. 1920.—The following habitat factors affecting vegetation along the seacoast are treated under influences associated with submergence in sea-water; salinity of sea-water, the tides, illumination at different depths, and temperature of sea-water. Physiographic influences, such as erosion and deposition, and atmospheric influences are also discussed. The plant associations of the eroding areas are divided into groups; those of rocky shores and bottoms include the seaweed associations of the sublittoral region, the seaweed associations of the littoral region, and the associations of the supralittoral. For shores and bottoms of glacial drift the same general divisions are made. A short discussion of succession along eroding coasts is given.—P. A. Munz.

105. SCHONLAND, S. Phanerogamic flora of the divisions of Uitenhage and Port Elizabeth. Mem. Bot. Surv. South Africa 1: 7-118. 1919.—The flora is made up of 129 orders, 716 genera, and 2312 species. The proportion of genera to species is 1: 32; of monocotyledons to dicotyledons 1: 2.6. Shore vegetation does not differ essentially from the vegetation in other similar localities along the south coast of South Africa. Halophilous meadows are particularly well developed at and near the mouth of the Zwartkops River and extend on its right bank to beyond Redhouse. The vegetation of the Van Stadens Mountains, apart from patches of thorn scrub and forests, has many features of a southwestern hill vegetation. On the coastal plateau thorn scrub is more frequent and eastern types more prevalent than on the Van Stadens Mountains. Karroid succulent vegetation occupies a large tract of country and is most typically developed in the northwestern parts. Karroid thorn scrub is not always sharply divided from the karroid succulent vegetation; numerous succulents are often mixed with it and patches of pure succulent vegetation frequently occur. Pure *Acacia* formation is not extensive and occurs in the eastern and northeastern portions. Pure grassland formation is found on a large part of the Zuurberg on the "grass ridge" east of Uitenhage and east of the Sundays

River near its mouth. Forest patches occur almost entirely in deep kloofs on the southern side of the mountains and hills close to the sea. From the phytogeographical point of view the divisions suggested by BOLUS are adopted but the eastern boundary of the southwest coast region is placed not at Van Stadens but in a line from Port Elizabeth through the Bethelsdorp hills.—*E. P. Phillips.*

106. THONE, FRANK E. A. **Pioneer plants on a new levee.**—IV. *Proc. Iowa Acad. Sci.* 25: 423-425. 1920.—The author notes chiefly the destruction of the locality described in three former papers, which describe a ruderal succession. A list of plants noted in 1917 is given.—*H. S. Conard.*

107. TRANSEAU, E. N. **Vegetation of Cape Breton.** [Rev. of: NICHOLS, G. E. *The vegetation of Northern Cape Breton Island, Nova Scotia.* *Trans. Connecticut Acad. Arts and Sci.* 22: 249-467. 1918. (See *Bot. Absts.* 1, Entry 833.)] *Plant World* 22: 145-146. 1919.

108. WAKSMAN, SELMAN A. **Fungi commonly found in soil.** [Abstract.] *Absts. Bact.* 4: 5. 1920.—“Soils, rich in organic matter, will be found to contain, if the moisture and temperature conditions are favorable, an abundant fungus growth. Soils with a low organic matter content may show a fungus growth, under special conditions which are not definitely established as yet, possibly at a high moisture content and at a relatively high temperature. The same species of fungi were found in localities as far apart as Alberta, Canada, Hawaiian Islands, Louisiana, Maine, and newly-formed soils from Tortugas Island. This tends to confirm the fact that even those fungi which have not been demonstrated to exist in a vegetative mycelial stage in all these localities, do produce a vegetative growth. When the conditions become unfavorable for the growth of these fungi, due to the climatic variations, the mycelium may be destroyed, but the spores, which are much more resistant to adverse conditions, survive, only to germinate and produce a fresh vegetative growth when conditions become favorable.”—Organisms are mentioned only by family or genus. [From author's *Abst. of paper read at scientific session, Soc. Amer. Bact.*]—*D. Reddick.*

109. YOSHII, Y. **Oekologische Studien über Vegetation der Ota Dünen.** [Ecological studies of the vegetation of the Ota dunes.] *Jour. Coll. Sci. Imp. Univ. Tokyo* 43: 1-68. 2 pl., 8 fig. 1919.—After a bibliographical introduction and a statement of the general characteristics of dune plants, the author discusses the specific influences of position, rainfall, temperature, wind, and other climatic factors on the movement and other behavior of the sands and the plants which live on them and hold them in place.—*G. J. Peirce.*

FLORISTICS

110. BARDIE, A. **Tulipes, primevères et anémones dans le Libournais.** [Tulipa, Primula and Anemone of Libournais.] *Actes Soc. Linn. Bordeaux Proces-verbaux* 69: 90-92. 1915-16. [Received May, 1920.]—The habitat and distribution of a few interesting plants are briefly described.—*W. H. Emig.*

111. BARDIE, A. **Le Mathiola incana et le Daphne laureola à Lormont.** [Mathiola incana and Daphne laureola at Lormont.] *Actes Soc. Linn. Bordeaux Proces-verbaux* 68: 84-87. 1914. [Received May, 1920.]

112. BAUDRIMONT, A. **Compte rendu de l'excursion faite a Bazas et dans les environs le 1er juin 1914.** [Report of the excursion to Bazas on June 1, 1914.] *Actes Soc. Linn. Bordeaux Proces-verbaux* 68: 67-72. 1914. [Received May, 1920.]

113. BOUCHON, M. **Excursion aux Quatre-Pavillons.** [Excursion to Quatre-Pavillons.] *Actes Soc. Linn. Bordeaux Proces-verbaux* 68: 54-55. 1914. [Received May, 1920.]

114. BOYER, G. Excursion de la Société Linnéenne, le 16 mai 1915, à la propriété Catros. [Excursion of the Linnean Society on May 16, 1915.] Actes Soc. Linn. Bordeaux Proces-verbaux 69: 29-30. 1915-16. [Received May, 1920.]

115. BOYER, G. Compte rendu de l'excursion de la Société Linnéenne à Léognan, le 27 juin 1915. [Report of the excursion of the Linnean Society to Leognan, June 27, 1915.] Actes Soc. Linn. Bordeaux Proces-verbaux 69: 31-32. 1915-16. [Received May, 1920.]

116. BRADSHAW, R. V. Rare plants of Oregon. Amer. Bot. 26: 18-19. 1920.—Notes on the occurrence of *Erodium moschatum*, *Linaria elatine*, *Centaurea nigra*, and *Cynosurus echinatus* near Eugene, Oregon.—W. N. Clute.

117. BURNHAM, STEWART H. The haunts of *Rhododendron maximum*. Torreyia 20: 28-31. 1920.—*Rhododendron maximum* L., a rare plant in New York, was found by the writer in 1904, in Michigan Hollow Swamp, between West Danby and Danby, Tompkins County, New York. About 7 distinct patches were found within a circumference of 600 feet. It is slowly spreading and in no danger of extermination. The plant is described and the associated vegetation indicated. A sketch-map showing the exact location of the station is added.—J. C. Nelson.

118. BURNHAM, STEWART H. The mosses of the Lake George flora. Bryologist 23: 17-26. 1920.—The article covers the families Sphagnaceae to Grimmiaceae (pars), and is to be continued. The author enumerates the sources of information (printed lists, collections, collectors), and attempts to give a comprehensive view of the present knowledge of the moss-flora of the region and of the work previously done. Seventy species besides many varieties are mentioned, under most of which there are detailed citations of localities or collectors.—E. B. Chamberlain.

119. BUSBY, ISABEL. A trip to Gosford. Australian Nat. 4: 125-127. 1920.

120. CHIOVENDA, E. Le piante raccolte dal Dr. Nello Beccari in Eritrea nel 1905. [Plants collected by Dr. Nello Beccari in Eritrea, 1905.] Nuovo Gior. Bot. Ital. 26: 89-114. 1919.

121. CRATTY, R. I. Notes on an introduced woodland flora. Proc. Iowa Acad. Sci. 25: 411-412. 1920.—An account of the woodland plants which appeared spontaneously in a grove in Emmet County, Iowa, which was planted in 1870 on a prairie six miles from native timber. *Liparis loeselii*, two ferns, and several shrubs are named. The locality is now mostly destroyed.—H. S. Conard.

122. C[REEL], E. Excursion to Brookvale. Australian Nat. 4: 141-142. 1920.—List of plants observed in various habitats.—T. C. Frye.

123. FAMILLER, I. Einige kritische Bemerkungen zu J. Röhl, Die Thüringer Torfmoose und Laubmoose und ihre geographische Verbreitung. [Critical remarks on J. Röhl's Thuringian mosses and their geographical distribution.] Krypt. Forsch. Bayerische Bot. Ges. 3: 187-188. 1918.—The remarks criticize or correct certain statements regarding the moss flora of Bavaria, made incidentally by Röhl. Some of these statements relate to Bavarian bryologists and their activities and others to records of Bavarian mosses.—A. W. Evans.

124. FITZPATRICK, T. J. The fern flora of Nebraska—I. Amer. Fern Jour. 10: 5-15. 1920.—The author divides the state into seven regions, discussing the geographic features and listing the species of pteridophytes found in each region. The fern flora of the state is represented by 17 genera and 26 species. An annotated list of species of Ophioglossaceae (2 genera and 3 species), Osmundaceae (1 genus and 2 species), and Polypodiaceae (1 species) is given.—F. C. Anderson.

125. FITZPATRICK, T. J. The fern flora of northeastern Iowa. Proc. Iowa Acad. Sci. 25: 417-421. 1920.—The counties of Winneshiek, Allamakee, Clayton, and Dubuque are in

the "driftless area," with beds of Cambrian sandstones and Lower Silurian limestones and shales. Thirty-three species are recorded, including *Botrychium*, *Osmunda*, *Azolla*, *Selaginella*, and *Isoetes*.—H. S. Conard.

126. GRAFF, PAUL W. Unreported ferns from Montana. Bull. Torrey Bot. Club 47: 125-129. 1920.—*Ophioglossum vulgatum* L., *Cystopteris fragilis* (L.) Bernh. var. *angustata* (Hoffm.) Luers, *Aspidium cristatum* (L.) Sw., *A. Filix-mas* (L.) Schrad., and *A. spinulosum* (O. F. Muller) Sw. var. *intermedium* (Muhl.) D. C. Eaton are given as occurring in Montana, although not previously reported from that state.—P. A. Munz.

127. HAMILTON, A. A. Excursion to Duck River. Australian Nat. 4: 140-141. 1920.—A list of plants observed.—T. C. Frye.

128. HERRE, ALBERT C. Notes on Mexican lichens. Bryologist 23: 3-4. 1920.—A list of 23 species with localities.—E. B. Chamberlain.

129. JENNINGS, O. E. Rarity of *Conopholis*. Amer. Bot. 26: 29. 1920.—*Conopholis* is regarded as not uncommon in Western Pennsylvania. The plants usually occur in elevated, poor, and probably acid soils, in black, red, or chestnut oak woods.—W. N. Clute.

130. KASHYAP, S. R. Distribution of liverworts in the western Himalayas. Jour. Indian Bot. 1: 149-157. 1920.—The author brings together the experience of a number of collecting trips into various parts of the western Himalayas. Liverworts occur at altitudes ranging from 700 feet on the plains to 13,000 feet. Thallose forms predominate. The number of species and individuals increases from the plains up to about 7000 feet, then decreases with higher altitudes; they decrease also in passing from east to west. The outer ranges are richest in species and individuals, the higher middle range stands next, the inner high range has very few, while beyond the inner range there are none. The outer or southern slopes are richer than the inner ones. A total of about 75 species is recorded. Lists of species are given for the various localities; Mussoorie, 78° 5' E. Long., 30° 27' N. Lat., altitude 6-7000 feet, stands first with 42 species.—Winfield Dudgeon.

131. KREBS, CARL. A rare Ohio plant immigrant. Amer. Bot. 26: 1. Pl. 1. 1920.—*Berberis aquifolia* reported as established in the Cuyahoga Valley, Ohio.—W. N. Clute.

132. LLAGNET, M. Liste des plantes récoltées à l'excursion de la fête-Linnéenne. [List of plants collected on the excursion of the Linnean anniversary.] Actes Soc. Linn. Bordeaux Proces-verbaux 68: 83-84. 1914. [Received May, 1920.]

133. LORENZ, ANNIE. Some Hepaticae from Matinicus Island, Maine. Bryologist 23: 1-3. 1920.—The article lists 21 species of hepatics, and contrasts the hepatic flora of Matinicus with that of Mt. Desert.—E. B. Chamberlain.

134. LOWE, RACHEL L. *Rhacomitrium sudeticum*, a moss new to Worcester County, Massachusetts. Bryologist 23: 4-5. 1920.—The moss occurs on Mt. Wachusett. References are included to further New England distribution.—E. B. Chamberlain.

135. McATEE, W. L. Notes on the flora of Church's Island, North Carolina. Jour. Elisha Mitchell Sci. Soc. 35: 61-75. 1919.—The paper includes a list of seed plants, with three ferns and one alga, collected or noted during several visits in 1909 and 1918. *Ilex vomitoria* is used by the inhabitants for making tea, but they regard *Asimina triloba* as poisonous.—W. C. Coker.

136. McATEE, W. L. Notes on the jack pine plains of Michigan. Bull. Torrey Bot. Club 47: 187-190. 1920.—A general description is given of the Jack Pine Barrens with lists of some of the plants found.—P. A. Munz.

137. NELSON, JAMES C. A noteworthy grass. Amer. Bot. 26: 10-12. Fig. 1. 1920.—*Coleanthus subtilis* described from the mountains of Bohemia in 1816 was first observed in America at Searles Island, in the Columbia river near the mouth of the Willamette in 1875. It has since been found at Hood River, Oregon, White Salmon and Bingen, Washington. Recently (Oct. 1919) it was reported from Hayden Island opposite Vancouver, Washington, by the author. The mature plant is only a few centimeters in length and the suggestion is made that it may be a native to America frequently overlooked because of its size and lateness in appearing.—W. N. Clute.
138. NELSON, JAMES C. *Tilia europaea* in Oregon. Torreyia 20: 31-32. 1920.—A specimen of *Tilia europaea* L. about 40 feet high was found on June 19, 1919, in the Calapooia Mountains along Smith River, near Gunter, Douglas County, Oregon, apparently perfectly established, and probably a relic of cultivation by an early apiarist, although the mountain-forest was apparently unbroken.—J. C. Nelson.
139. PALMER, ERNEST J. The canyon flora of the Edwards Plateau of Texas. Jour. Arnold Arboretum 1: 233-239. 1920.—The author gives an account of the physiography of the Edwards Plateau and of the general character of its vegetation, which is xerophytic except along the water courses. Particular attention is drawn to the occurrence of *Taxodium distichum* along the lower river courses. The most remarkable feature of the flora is the presence in the upper canyons of small colonies of many species belonging to the Gulf and Atlantic coastal plain flora. These colonies are explained as relics of a former extension of the coastal plain forest across the Edwards Plateau possibly almost to the base of the Rocky Mountains. After the elevation of the region had taken place about the close of the Tertiary period, the climatic changes caused the gradual disappearance of the forest, which was replaced by the semi-desert flora of the southwest and of northern Mexico except in sheltered spots in the canyons where vestiges of the original flora persisted.—Alfred Rehder.
140. QUEYRON, PH. Une herborisation au Pech de Berre, près Arguillon (Lotet-Garonne). [Botanizing at Pech de Berre, near Arguillon.] Actes Soc. Linn. Bordeaux Proces-verbaux 69: 26-29. 1915-16. [Received May, 1920.]
141. SOTH, MRS. BLANCHE H. Wildflower distribution in the West. Amer. Bot. 26: 14-16. 1920.
142. STANDLEY, PAUL C. Sphagnum in Glacier National Park, Montana. Bryologist 23: 5-6. 1920.—The occurrence of 4 species is noted.—E. B. Chamberlain.
143. TADULINGAM, C. Short notes on distribution, etc. Jour. Indian Bot. 1: 125. 1919.—New localities in India are recorded for *Juncus bufonius* L. and *Pyrenacantha volubilis* Hook.—Winfield Dudgeon.
144. VICTORIN, M. Random botanical notes. III. Isle-aux-Coudres, Quebec. Canadian Field-Nat. 33: 114-117. 1919.—The more characteristic plant species of various ecological regions of an island of the St. Lawrence River are enumerated. Several species of *Carex* receive special mention.—W. H. Emig.
145. WATERHOUSE, G. A. Report of the excursion to Narrabeen, 11th October. Australian Nat. 4: 127. 1920.
146. WILSON, E. H. The Liukiu Islands and their ligneous vegetation. Jour. Arnold Arboretum 1: 171-186. 1920.—An account of the woody plants of the Liukiu Islands is given, preceded by introductory notes on the geography, history, and population of the islands. The flora of the northern group of islands is related to that of Japan, that of the southern group to the flora of Formosa. The vegetation is characterized by the evergreen shining foliage of most of the woody plants and by the presence of Mangrove-like trees, *Cycas*

revoluta, *Pinus luchuensis*, and two palms. The flora contains according to our present knowledge 351 species and 23 varieties representing 233 genera; a considerable number of the species and most of the varieties are endemic. A systematic enumeration of the woody plants concludes the article and contains a new species, a new variety, and a new combination: *Elaeagnus liukiensis* Rehd., *Rhamnus davuricus* var. *liukiensis* Wils., and *Zanthoxylon okinawensis* (Nakai) Wils. A list of the woody plants of the Kawanabee Islands, which connect Japan and the Liukiu Islands, compiled by Ushiwo is appended.—*Alfred Rehder*.

APPLIED ECOLOGY

147. NAUMANN, EINAR. Tillämpad limnologi. Några teoretiska grundlinjer för en rationell vattenkultur. [Applied limnology. Some theoretical principles of a rational water culture.] K. Landtbr. Akad. Handl. och Tidskr. 58: 199–221. 1919.—A discussion of plankton in relation to environmental conditions, methods of improvement, and utilization as fish food.—*E. G. Anderson*.

FORESTRY AND FOREST BOTANY

RAPHAEL ZON, *Editor*

J. V. HOFMANN, *Assistant Editor*

(See also in this issue Entries 48, 82, 86, 89, 422, 505, 572, 576, 688)

148. ANONYMOUS. Distillation of sandal oil. Australian Forest. Jour. 3: 316–318. 1920.—A note on the recently developed sandalwood oil industry in Western Australia.—*C. F. Korstian*.

149. ANONYMOUS. Forest trails and highways of the Mount Hood region, Oregon National Forest, Oregon. U. S. Dept. Agric. Dept. Circ. 105. 32 p., illus. 1920.

150. ANONYMOUS. Ironbark versus jarrah. Australian Forest. Jour. 3: 239. 1920.—A note on a test conducted by WARREN of Sydney University to determine the comparative strengths of New South Wales *Eucalyptus paniculata* and *E. marginata*. As a result of a simple cross breaking test the former (iron-bark) proved the stronger of the 2 species.—*C. F. Korstian*.

151. ANONYMOUS. A mountain vacation land. U. S. Dept. Agric. Dept. Circ. 132. 10 p., illus. 1920.

152. ANONYMOUS. A new textile from the bark of the "silkworm mulberry." Sci. Amer. Monthly 2: 152. 1920.

153. ANONYMOUS. Snöbrott och topröta hos granen. [Snow breakage and top rot in spruce.] Skogsvårds Föreningens Tidskr. 17: 173x–181x. 1919.—The article reports a discussion by Swedish foresters of an address on the above subject by T. LAGERBERG at the annual meeting of the association, March 15, 1919.—*G. A. Pearson*.

154. ANONYMOUS. A thinning area re-visited. Australian Forest. Jour. 3: 251–254. 1920.—A brief discussion of the failure of the seedling crop in rather heavily thinned stands of *Eucalyptus*, which is attributed to: (1) Heavy grazing and rabbit injury in dry years, the latter being the principal cause of the damage, leaving the forest dependent on coppice for regeneration; (2) removing all mature standards and not leaving seed trees, the immature standards being too young to produce seed; and (3) the absence of humus, which is regarded as a minor cause.—*C. F. Korstian*.

155. ANONYMOUS. **The timbers of commerce.** [Rev. of: HOWARD, A. L. *A manual of the timbers of the world, their characteristics and uses.* xvi + 446 p. Macmillan and Co.: London, 1920.] *Nature* 106: 80-81. 2 fig. 1920.—“Mainly a descriptive account of the commercial uses. . . . practically confined to those imported into London and Liverpool. . . . book, in short, is excellent on the commercial side.”—O. A. Stevens.

156. ARENS, P. **Ziju aan het tappen met driptris voordeelen verbonden?** [Does tapping with driptins give any advantage?] Mededeel. Proefsta. Malang [Java] 25. 1-16. 1919.—Reprinted from the Arch. Rubbercult. 3: 36-41. 1919.—Carl D. La Rue.

157. BENNETT, H. C. **Progress report of forest administration in Coorg for 1918-19.** 27 p. Bangalore, British India, 1920.—An annual report with appended tabulated data. The reserved forests now total 520 square miles. The proportion of total forest area open to cattle increased from 71 to 86 per cent and the number of animals grazed increased from 2985 to 13,376. All spike experiments with sandal by burning the area have given negative results with one exception where a tree was found to have become spiked by this treatment. Owing chiefly to reduction in output and decrease in price of sandalwood the revenue of the province fell below that of the previous year.—E. R. Hodson.

158. BLUNT, A. W. **Progress report of forest administration in the province of Assam for 1918-19.** 59 p. Shillong, British India, 1919.—An annual report covering in some detail all forest operations. At the end of the year the total area of the reserved forests of the province was 5495 square miles representing a net increase in the last five years of 1,114 sq. mi. Owing to reservation of forests and the extension of cultivation, the area of unclassified State forests was reduced by the close of the year to 10,050 sq. mi. The total decrease during the last five years was 2092 sq. mi. A systematic division of waste lands into those suitable and those unsuitable for reservation, which will greatly help in establishing a definite scheme of reservation, is now being made. During the last five years the annual surplus has averaged 450,516 Rs. The forest devastation caused by sugarcane cultivation is noted. “It is the most destructive of all forms of shifting cultivation, and after a crop of sugarcane has been taken off an acre for 3 or 4 years in succession nothing will grow except weeds and hardy shrubs like the *Eupatorium oderatum*.” A species of *Peridermium*, closely allied to *P. cerebrum* Peck, is attacking *Pinus khasya* but is confined to elevations over 5500 feet. A report was submitted on the damages caused by floods and protection of catchment areas at the head-waters of rivers, but action has been postponed until the services of a special officer become available. The usual formal tabulated summaries are appended and a map of the province is included.—E. R. Hodson.

159. BOAS, I. H. **The manufacture of alcohol from waste wood or sawdust.** Australian Forest. Jour. 3: 269-270. 1920.—The development of this industry is traced especially with reference to conditions in America.—C. F. Korstian.

160. CARLETON, M. B. **The soap nut tree.** Amer. Forestry 26: 621. 1 fig. 1920.

161. DACY, G. H. **Where willow ware comes from.** Sci. Amer. 123: 222, 235. 5 fig. 1920.—How the willow tree is grown and tended to yield the raw materials of furniture and basket factories.—Chas. H. Otis.

162. DIEDEN, HENRIK. **Om Skögsförhållandena på Island.** [Forest conditions in Iceland.] Skogen 6: 293-300. Fig. 1-7. 1919.—About 1000 years ago when Iceland was colonized by the Vikings large portions of the island were forested. The forests, however, were gradually destroyed by cutting and fire followed by drifting sands, while sheep grazing prevented or at least greatly interfered with reproduction. At present 500 square kilometers are classified as forest land, but of this only 500 hectares are forested. Practically all lumber is now imported from Sweden and Norway. High prices incident to transportation charges have necessitated the use of all kinds of wood substitutes for fuel and construction. Steps are now

being taken to re-establish the forests by planting (mainly experimental) and by fencing partially wooded areas against sheep. Only the native birch and possibly Siberian larch give promise of success in forestation. Exotics planted at the experiment station at Aukureyri have not proved satisfactory. Failure is attributed primarily to a moisture deficit brought about by the combined action of a fine impermeable soil and excessive transpiration due to high winds.—*G. A. Pearson.*

163. GIBSON, A. J. Development of turpentine industry in Germany during the war. *Indian Forester* 46: 525-531. 1920.—A short review of a number of papers given in the bibliography (17 titles) covers in a general way the development of the industry in Germany.—*E. N. Munns.*

164. GILL, WALTER. Fire protection. *Australian Forest Jour.* 3: 199-201. 1920.—A paper read at the Hobart Forestry Conference. The author discusses the subject of fire protection in Australia under the following heads: (1) Fire-breaks, (2) fire-towers, (3) telephones, (4) fire-fighting equipment.—*C. F. Korstian.*

165. GRAVES, HENRY S. The Northern Pacific Railway or the nation—which? *Jour. Forestry* 18: 675-680. 1920.

166. HATTON, JOHN H. Live-stock grazing as a factor in fire protection on the national forests. U. S. Dept. Agric. Dept. Circ. 134. 4-11, pl. 1-5. 1920.

167. HAY, R. D. Report of the forestry commission for year ending June 30, 1920. 34 p., *Illus.* Sydney, New South Wales, 1920.—A revised scheme of forest management requiring stricter regulation and control over forest working, more complete and systematic utilization of timber and other forest products and payment therefor, has been established. In some cases the Commission had to undertake the felling and direct conversion of standing timber to remedy wasteful practises. A training school for forestry students was opened with seven students during the year.—The State forests now total 5,085,050 acres. *Zamia palm (Macrozamia spiralis)* was investigated as a source of industrial alcohol, the bulbs yielding 13.3 gallons per ton and 8.19 per cent starch. Mountain ash (*Eucalyptus gigantea*) excelled other timbers for airplane construction. Mountain gum (*E. dalrympleana*), blackbutt (*E. pilularis*), and spotted gum (*E. maculata*) are to be tested on a commercial scale for paper pulp value, as these species can be supplied in fair quantity in connection with the working and silvicultural treatment of the State Forests. Mangrove is important in oyster culture and in protecting foreshores from erosion; but owing to the difficulty of supervision, the areas below high-water mark are being turned over to fishery officials.—*E. R. Hodson.*

168. HELMS, J. Egene i Silkeborgegn. [The oaks around Silkeborg.] *K. Veterinaer og Landbohøjskole Aarsskr.* 1920: 197-222. Fig. 1-18. 1920.—In Denmark *Quercus pedunculata* is the common species, and only in northern Jutland is *Q. sessiliflora* found to any extent, where it is planted only as a part of the original natural forest. Hybrids of the two species are also found. From 1820 to 1905 only small quantities of the two species were planted, but in latter years larger areas have been laid out with oak. The remaining old oaks in the Silkeborg forests cannot be regarded as typical of the original oak forest; they have been left because of their bad form or inaccessibility. Although the wood is injured by frost cracks, and the young leaves by late frosts, *Q. sessiliflora* is better adapted for the locality than the other species.—*Ernst Gram.*

169. HOWARD, S. H. Poisoning *Bauhinia vahlii*. *Indian Forester* 46: 562-572. 1920.—A number of poisons variously applied were tried to develop an effective method of killing climbers. The results were rather inconclusive. However, one application of mercuric chloride or sodium arsenite to the cut and split ends sufficed to kill the climbers. Root sprouting does not seem to be prevented.—*E. N. Munns.*

170. JOHNSON, F. R. **Forests in the sand hills.** Amer. Forestry 26: 582-584. 4 fig. 1920.—One of the first forest plantations in western Nebraska was established in 1891. Jack, Scotch and yellow pine were used, with good results. In 1903 a plantation was established with jack pine seedlings from the forests of Minnesota. These trees are now 20-25 feet in height and forest conditions prevail. Nurseries with a large annual output have been established. Western yellow pine (*Pinus ponderosa*) and jack pine (*Pinus divaricata*) are best adapted to this region. Three-year old transplants are used and planted in furrows. Method of planting and special tools used including the "trencher," are discussed. Fire protection has been very effective, fire lines a rod wide dividing the plantations into units of about 160 acres.—Chas. H. Otis.

171. JUDD, C. S. **The first algaroba tree in Hawaii.** Amer. Forestry 26: 605-606. 2 fig. 1920.—The characteristics and uses of *Prosopis juliflora* DC. are discussed.—Chas. H. Otis.

172. KRAUCH, HERMANN. **The use of stand graphs in determining the limitation of cut.** Jour. Forestry 18: 719-722. 1 fig. 1920.—To properly mark a stand for cutting rate of growth and volume on the ground should be known, but unless the marker keeps a record of the cut and what remains, there is no way to determine the amount left on the ground. A method of determining the safe diameter limit and how much remains on the ground is described. Charts show the per cent of trees of each diameter class on a sample plot and the per cent of the volume in each of these classes for each species. When the final stand is decided upon, by using these percentages, the volume to be cut may be arrived at by cutting each species to a diameter limit.—E. N. Munns.

173. LAGERBERG, TORSTEN. **Snöbrott och toppröta hos granen.** [Snow breakage and top rot in spruce.] Meddel. Statens Skogsförsöksanst. 16: 115-162. Fig. 1-11. 1919.—Working plans are often seriously disrupted by snow damage. The calculated annual yield may be greatly increased by the salvaging of fallen or badly injured trees. Even uninjured trees must sometimes be cut in order to save them from windfall or drought. Until recently it has been a difficult problem to decide what character and degree of damage is permissible in trees which are left. The present investigation shows that broken stems are almost invariably attacked by rot, and therefore should be removed from the stand. The rot progresses more rapidly in rapidly growing than in slow growing trees. Callus and exudations from the wound may delay and in rare cases prevent infection.—G. A. Pearson.

174. LANE-POOLE, C. E. **Report of the Forests Department for the year ended 30th June, 1920.** Ann. Progress Rept. Forests Dept. Western Australia. 30 p. Perth, 1920.—The work of the Department for the fiscal period is briefly summarized under the following captions: "Classification of forests, reservations, forest work, forest ranging and timber inspection, plantations and nursery work, timber industry, kiln drying, firewood, mining timber, revenue and expenditure, botanical, entomological, tan barks, commonwealth forest products laboratory, sandalwood, kingia grass tree fiber industry, regulations, interstate forestry conference, publicity and staff." The total area classified to date amounts to 3,550,000 acres. A start was made in the preparation of two preliminary working plans. Western Australia is awakening to the possibilities of kiln drying. The overcutting of the sandalwood supplies of the State is causing considerable concern. The organization of the Department was delayed through the impossibility of obtaining the necessary staff. The report is appended by detailed statements of revenue and expenditure; production of mill timber and lists of concessions; leases; sawmill, hewing, firewood, sawmilling, and miscellaneous permits; herbarium specimens collected and identified; trees grown and planted at the Hamel State Nursery; forest insects in the departmental collection; and particulars of prosecutions during the year.—C. F. Korstian.

175. LEAVITT, CLYDE. **The British Empire forestry conference, 1920.** Jour. Forestry 18: 669-675. 1920.—Foresters from twenty-three countries in the British Empire met in July, 1920 and decided upon a definite plan of action. Some of the more important measures to be

put into effect in each of the countries are: (1) The adoption of a forest policy enforced by foresters; (2) a survey of the resources of which there is no definite knowledge at present; (3) the development of a personnel to handle forestry matters under constitutional authority; (4) organization of forest industries; (5) education and publicity; (6) distribution of free plants for tree planting; (7) development of forest research by the states; (8) the establishment of a forestry bureau.—*E. N. Munns.*

176. LEE, YIN KUNG. [A comparative study of Chinese and Japanese forestry.] Khu-Shou [Science-Publ. Chinese Sci. Soc.] 5: 832-841. 1920.—The author presents a comparison of the present state of forestry in China and Japan, and discusses fully forestry administration and management in the two countries.—*Chunjen C. Chen.*

177. MAAS, J. G. J. A. Een duffelmes voor het maken van Hevea plakoculaties. [A double knife for making patch buddings on Hevea.] Mededeel. Alg. Proefsta. A. V. R. O. S. [Medan, Sumatra] Rubberserie 23. 1919.—A reprint from Arch. Rubbercult. 3: Alg. Gedeelte 73-75. 1919.—*Carl D. La Rue.*

178. MAAS, J. G. J. A. A. Gewijzigde methode voor veldproeven bij Hevea. B. Nog eenige keimproeven met Hevea zood. [A. Other methods for field experiments with Hevea. B. Further germination trials with Hevea seed.] Mededeel. Alg. Proefsta. A. V. R. O. S. [Medan, Sumatra] Rubberserie 19. 1919.—A reprint from Arch. Rubbercult. 3: 233-245. 1919.—*Carl D. La Rue.*

179. MAAS, J. G. J. A. Vegetatieve voortplanting von Hevea brasiliensis. [Vegetative reproduction in Hevea brasiliensis.] Mededeel. Alg. Proefsta. A. V. R. O. S. [Medan, Sumatra] Rubberserie 20. 1919.—A reprint from Arch. Rubbercult. 3: 280-312. 1919.—*Carl D. La Rue.*

180. MACKAY, H. Forestry in Victoria. Australian Forest. Jour. 3: 212-215, 246-248. 1920.—The present are the fourth and fifth (concluding) installments of this paper. Coniferous plantations in southeastern Australia are considered with special reference to the relative merits of different species. *Pinus radiata*, *Pinus laricio*, *Pseudotsuga taxifolia*, *Picea sitchensis*, and *Pinus ponderosa* are discussed quite extensively. Mention is made of the climatic effect of tree denudation and the establishment of a forest school at Creswick.—See also Bot. Absts. 6, Entry 1038; 7, Entry 133.—*C. F. Korstian.*

181. MAYES, W. Progress report on forest administration in the Punjab for 1918-19. 133 p., 1 map. Lahore, British India, 1919.—At the end of the year the forest areas in square miles were: Reserved, 1747; protected, 4169; unclassified, 767; leased, 361. Fire devastated 3.17 per cent of the total area. In the irrigated plantations 1575 acres were sown, bringing the total area to 6123 acres. The cut of timber during the year in cubic feet was 7,243,000, and of firewood 27,158,000. At the Jallo factory 28,778 Maunds (maund = 80 pounds) of resin were distilled as compared with 16,426 in the previous year. The surplus fell from 934,704 Rs. the previous year to 568,472 Rs., due largely to cancellation of war contracts. It is stated that the time has now come for developing the hill forests by intensive management and working to the utmost capacity the irrigated plantations in the plains. Further postponement of this development is no longer desirable. At present the greatest needs of the department are an increased staff and an extended use of mechanical appliances for extraction coupled with improved communications. Staff is needed especially for the revision of working plans, the application of specialized engineering methods, investigation and opening of new markets, development of new industries, and for research work in silviculture and forest economics. In Bashahr the produce of thinnings, formerly unsalable, is being profitably exported. In the Pabbi, natural reproduction of *Prosopis glandulosa* continues to be good, but other species were mostly killed by drought. Spruce timber suitable for airplane manufacture is not likely to be obtainable from Bashahr, as it is too knotty and the river Sutlej and its tributaries are so rough that the driving of long scantlings is difficult. Kulu is a promising source of supply, as the driving conditions there are much better. Experiments (as with ban

oak in Kangra) have shown that *Acacia modesta* in Jhelum and Rawalpindi can be coppiced at any season of the year without trimming the stumps. In Lahore it is found that shisham seed collected from coppice is as good for cultural purposes as that from seedling trees. While difficult, an attempt will be made to control the shisham fungus by the use of watering trenches instead of flooding the whole area. Yield tables have been completed in Kulu during the year for deodar, blue pine, Chil, and fir. From ten years' observations and experiments it is concluded that the shelter-wood compartment system is the best method of insuring the regeneration of the coniferous forests of Kulu, and this system is therefore being adopted in the new working plan for the locality. European larch is doing well experimentally in Kulu. Various species of *Eucalyptus* in the Simla hills in experimental plantings still give no encouragement. The time seems at hand for appointing a Utilization Conservator (as in the United Provinces) for the Punjab to be the business head of the Department and control all its timber works, the sale of timber, the resin industry, and be in charge of the development of new markets and industries. The Government of India is considering co-operation of the Punjab with the North-West Frontier Province and Baluchistan with this idea in view, and also a plan of administrative reorganization.—*E. R. Hodson.*

182. PALMER, ANDREW H. **Economic results of deficient precipitation in California.** Monthly Weather Rev. 48: 586-589. 1920.—Because of markedly deficient precipitation in northern and central California during the past 4 rainy seasons serious loss resulted during the dry season of 1920. Streams reached the lowest stages on record. The Sacramento River at Sacramento fell below mean sea level, and the current of the stream was reversed. The saline waters of San Francisco Bay encroached upon rich agricultural lands of the delta region, reducing the vegetable crops, driving the dairy industry to other regions, and threatening irreparable damage to alluvial soils through the infiltration of salt water. The teredo, or "ship worm," a minute salt-water organism, did great damage to wooden structures. The average yield per acre of many crops was reduced in 1920 because of deficient moisture. Rice growers felt the drought keenly, because of the large water requirements of rice. Hydroelectric power shortage resulted in power restrictions and higher rates. Wells went dry because of the lowered level of ground water. Forest fires were more frequent and destructive than in past years, owing to the parched condition of the forests.—*Author's abstract.*

183. PEARSON, R. S. **The utilization of bamboo for the manufacture of paper pulp.** Indian Forester 46: 547-561, 603-631. 2 pl. 1920.—The supply of pulp woods is getting lower throughout the world and the price and demand are rising. Paper companies are now turning to plants other than trees and the bamboo has been found to be suitable for ground and sulphite pulp. Data are given on the probable yields, costs of extraction, location of mills, etc., for the various localities in India where pulp material exists in sufficient quantity to warrant the establishment of pulp mills.—*E. N. Munns.*

184. PEMBERTON, C. C. **Living stumps of trees.** Amer. Forestry 26: 614-616. 6 fig. 1920.—There are instances of stumps of cut trees which do not die, and which retain their vitality to a surprising extent and apparently without the aid of foliage. It is concluded that the union or indirect grafting of roots of the cut stump with those of living trees standing adjacent accounts for the phenomenon.—*Chas. H. Otis.*

185. PERROT, EM. **Notes biologiques sur les Acacias fournisseurs de gomme, dite arabique, au Soudan égyptien.** [Biological notes on the Acacias producing gum arabic in Egyptian Sudan.] Compt. Rend. Acad. Sci. Paris 171: 253-268. 1920.—The method of making the incision is described as is also the process of healing. The season for flowing is from May to October.—*C. H. Farr.*

186. PETRIE, W. B. **Effect of cultivation on tree growth.** Australian Forest. Jour. 3: 231. 1920.—A note on the increased growth of *Agathis robusta* and *Grevillea robusta* due to cultivation.—*C. F. Korstian.*

187. PETRINI, SVEN. Några sympunkter på variations—och korrelationsräkningar. [Notes regarding variation and correlation calculations.] Skogsvårdsföreningens Tidskr. 17: 238x-243x. 1919.—A reply to criticisms by L. MATTSSON MÅRN of Petrini's investigations on the use of the "form-point" method in determining form-class and volume.—G. A. Pearson.

188. PETRINI, SVEN. Formhöjdstillväxten i tallbestånd inom Västerbottens Län. [Increment per cent of the form-height in pine stands in Sweden.] Meddel. Statens Skogsförsöksanst. 16: 184-187. Fig. 1. 1919.—Volume increment per cents are calculated from the basal area increment per cent and the "form-height" increment per cent. The latter term expresses the product of height and form factor. If tables of "form-height" increment per cent are available the increment per cent may be ascertained by merely measuring diameters. JONSON has prepared such tables for pine in middle Sweden. Petrini, following JONSON's procedure, has prepared similar tables for northern Sweden, where the pine has a different form. The method which is briefly described involves the measurement of heights and the determination of "mean form class" by means of the "form-point" and JONSON's function between "form-point" and "form-class."—G. A. Pearson.

189. PETRINI, SVEN. Om formpunktsbedömning. [The "form-point" as an expression of trunk-form.] Meddel. Statens Skogsförsöksanst. 16: 164-183. Fig. 1-5. 1919.—The investigation aims to test the accuracy of JONSON's "form-point" method of estimating volume and taper when applied to different stands and individual trees, and also the variations in results obtained by different persons. Estimates were made on 54 sample plots each having an area of 0.6 acre. On 10 of the plots the "form-point" was determined by 6 different persons. Estimates for single stands show an average deviation of ± 4 per cent of the height of the tree. The average personal error for a stand was 1.17 per cent. Estimates of individual trees by different persons varied as much as 10 per cent. The author concludes that the "form-points" of single trees can not be estimated with any great degree of accuracy, but that the average "form-point" of a stand can be satisfactorily determined.—G. A. Pearson.

190. PINCHOT, G. Pennsylvania chestnut trees to be sold to save timber left by blight. Amer. Nut Jour. 12: 91. 1920.—For the last 15 years all efforts to control blight have failed. The removal of trees for use as timber is proposed.—E. L. Overholser.

191. RAO, B. I. SHAMA. Note on the artificial raising of bamboos in the Akola division of the Berar Circle, C. P. Indian Forester 46: 518-525. 1 pl. 1920.—Bamboo has been successfully introduced by sowing and planting in the Central Provinces. Watering and cultivation are helpful to both seedlings and transplants, but the latter may succeed with little outside assistance if under a high cover as in the forest. Grazing and fire are destructive and must be prevented in areas recently planted.—E. N. Munns.

192. RICHARDS, EDWARD C. M. Forest conditions and primitive forest practice in West Persia. Jour. Forestry 18: 710-718. 1920.—Zoroastrianism, or fire worship, before the Moslem conquest of Persia is responsible for great ash heaps where the ancient Parsees kept the eternal fires of their shrines burning, and these ash heaps are probably the remains of the former forest. Though the people are dependent on the water supply to keep their lands productive, the lack of a forest cover in the mountains is not appreciated and crop failures and famines are frequent. Fuel woods are scarce and nearly all bushes and weeds are gathered for fire. In scattered places and at considerable distances from habitations, junipers, almonds, and haws were found growing naturally without irrigation. Poplar is the chief tree and is kept trimmed down to a small top so that it forms a long slender pole. The wood is the chief supply of the country. Willows growing along water courses are used for fuel and water pipes. Pollarding and coppicing is the rule, cutting every three years. Other trees of value are the plane, elm and walnut. Persia is in great need of forestry but the political situation is such that it is as yet far off.—E. N. Munns.

193. SABROE, AXEL S. *Flaadning i Siam och Japan*. [Log driving in Siam and Japan.] Skogsvårdsföreningens Tidskr. 17: 281-304. Fig. 1-13. 1919.
194. SALISBURY, E. J. [Rev. of: BAKER, R. T. *The hardwoods of Australia and their economics*. xvi + 522 p., 134 colored pl., 192 fig. Dept. of Education: Sydney, 1919.] Sci. Prog. [London] 14: 689-691. 1920.
195. SALISBURY, E. J. [Rev. of: HICKEL, R. *Graines et plantules des arbres et arbustes indigènes et communément cultivés en France*. (Seeds and seedlings of trees and shrubs indigenous and commonly cultivated in France.) Part I. *Conifers*. 182 p., 93 fig. Part II. *Angiosperms*. 349 p., 2 pl., 85 fig. Published by the author: Versailles, 1911 and 1914; received 1919.] Sci. Prog. [London] 14: 691-692. 1920.
196. SHERRARD, E. C., AND G. W. BLANCO. *The preparation and analysis of cattle food, consisting of hydrolyzed sawdust*. Jour. Indust. Eng. Chem. 13: 61-65. 1921.—Sawdust is hydrolyzed with 1.8 per cent sulphuric acid for 15 or 20 minutes under a steam pressure of 120 pounds. The resulting liquor is neutralized and evaporated under reduced pressure to the consistency of a thick syrup. The syrup is mixed with the sawdust residue and dried.—*Henry Schmitz*.
197. SINTUREL, E. *La forêt de Fontainebleau de 1789 à 1794*. [The forest of Fontainebleau from 1789 to 1794.] Rev. Eaux et Forêts 58: 218-226, 255-263, 281-288. 1920.—See Bot. Absts. 7, Entry 708.
198. SPARHAWK, W. N. *Suggestions for rating risks in forest insurance*. Jour. Forestry 18: 701-709. 1920.—Fire insurance rates for forests should be determined along lines similar to those followed in other kinds of insurance, an outline of which is given. The damage by a forest fire depends on the area burned and the relation between values before and after the fire. Area depends on the number of fires, and the number of the contributing causes. The area burned per fire depends on climate and type as well as inflammability, as do also the values at stake and destroyed. A classification of forest risks is suggested based on climate, on forest types, on age groups, on inflammability, and on occurrence. The loss costs may then be determined by a method similar to that employed in the ordinary form of insurance and it should take but a short time to determine these losses if all agencies cooperate for a few years.—*E. N. Munns*.
199. STARTE, H. W. *Anjan (Hardwickia binata) coppice*. Indian Forester 46: 641-647. 1920.—The best season for coppicing this species is between August and November, the worst from May to July. The height of the stump influences the reproductive power, 12 to 18 inches furnishing the strongest shoots and below 12 the weakest.—*E. N. Munns*.
200. STARTE, H. W. *Further experiments in Salai (Boswellia serrata) tapping in the Shirpur east range of N. Khandesh Division*. Indian Forester 46: 578-580. 1920.—Trees with green bark yield more gum-oleo-resin than dry-barked trees; those with short boles yield less than those with long boles; and hollow trees yield more "drip" than sound ones though the total yield is less. Heaviest yields were secured in the dry season and the best in the fourth month after tapping.—*E. N. Munns*.
201. SUDWORTH, GEO. B. *Unique example of the propagation of sugar maple from a cutting*. Amer. Forestry 26: 625. 2 fig. 1920.
202. SWAIN, E. H. F. *The financing of forestry*. Australian Forest. Jour. 3: 279-283, 300-305. 1920.—A paper read at the Hobart Forestry Conference. The insolvency of forestry in Australia, the responsibilities of the Australian Forest Services, timber imports, the colossal post-war timber requirements, financial reform, proper selling methods, efficient forest organization including adequate finances, the subsidizing of forestry and the need for an effective timber tariff are treated, followed by a round-table discussion.—*C. F. Korstian*.

203. SYLVEN, HELGE. Skogsvårdsförhållandena i Nordamerikas Förenta Stater och dess skogars framtid. [Forestry and the forest outlook in the United States of America.] *Skogen* 6: 257-271. Fig. 1-10. 1919.—The article gives a survey of the country's original and present timber resources; it rehearses the well known story of forest devastation which has led to the present agitation for a national forest policy. The provisions of the policy proposed by the U. S. Forest Service are outlined. Considerable space is given to the organization of the Forest Service. The author welcomes the entrance of the U. S. A. into the field of forestry as an important step toward the welfare, not only of the country itself but of the entire world. Expression is given to the idea that the forest question before the industrial world is no longer one of commercial competition, but how best to meet the problems of production, distribution, and utilization with a view toward supplying the needs of all countries. It is prophesied that the United States will rapidly take a place among European nations in the practise of forestry once the control of forest affairs is placed in the hands of the American foresters, to whose ability and enthusiasm he pays a high tribute.—G. A. Pearson.

204. TOUMÉY, J. W. Reshaping our forest policy. *Sci. Monthly* 12: 18-35. 1921.—The failure of the U. S. A. to retain control of the forests and the consequent exploitation by private owners without reference to continuation of the forest has resulted in an acute situation. The lumberman and paper manufacturer, as well as the forester, are beginning to realize the necessity of a change, especially in view of the increasing prices of forest products. —Three leading policies are now before the country: (a) The program of the committee of the Society of American Foresters; (b) the program of the American Paper and Pulp Association and various lumber interests; (c) the program of Colonel H. S. GRAVES, former Chief of the United States Forest Service. These do not differ in desired results, but in methods of attaining them. The first proposes that laws be enacted by Congress imposing severe penalties on private owners who do not organize their property and practise forest renewal. The second insists that through co-operation and financial support the nation and the states make sustained yield on privately owned forests attainable without loss to the owner. The last urges that the state enforce mandatory regulations and provide adequate assistance in co-operation with the National Government to make forest renewal certain. Under this plan federal legislation would control extension of national forests, co-operate with the states in forest protection and silviculture and have control over such questions as forest taxation and insurance, loans on growing timber, land classification, forest surveys. State legislatures would enact laws holding private owners responsible in case of forest devastation. This plan would necessitate effective measures for organization, police regulations for fire control, effective disposal of slash in all cutting operations, establishing cutting methods suited to each forest type, etc.—L. Pace.

205. TURNER, E. P. Report of forestry department of New Zealand for year ending March 31, 1920. 36 p. Wellington, New Zealand, 1920.—An annual report covering all forest operations. During the last session of the General Assembly the State Forests Act of 1908 was amended to provide for the proclamation of national-endowment lands as provisional state forests. 3,311,000 acres of Crown lands and 56,066 acres of national-endowment lands were proclaimed provisional State forests during the year under recent legislative enactments. While largely forest of a protective character, a considerable area carries forest of present value for milling. The use of firewood for domestic purposes requires encouragement in every reasonable way. Coal is increasing in value and its use should be confined to those purposes for which firewood is not a satisfactory substitute. Approximately 11,724,000 trees were raised in the four State nurseries the past year: 3,710,900 were sent to various plantations and 277,235 to farmers and local bodies. A valuable and exhaustive report by Sir D. E. HUTCHINS on the forests of the North was published during the year.—E. R. Hodson.

206. WIMBUSH, A. Prolific growth of root-suckers in *Dalbergia latifolia*. *Indian Forester* 46: 573. 1 pl. 1920.—Roots cut off at a depth of four feet send up strong shoots from that portion not connected with the parent tree.—E. N. Munns.

207. ZON, RAPHAEL. The outlook for extending American lumber trade in Italy. Jour. Forestry 18: 723-730. 1920.—Prior to the European war, the Italian forests were being greatly overcut in spite of heavy importation from other countries. During the war, the home forests were badly depleted and injured by indiscriminate and heavy cutting. Italy now finds herself with new provinces with new sources of wood supply; but with the need of recuperation in her own forest area and the increased demand, Italy will need much additional lumber. The price of lumber in America and the prevailing exchange rates prevent this country from furnishing much of a supply; but the new countries around the Mediterranean should be able to supply much of the demand.—*E. N. Munns.*

GENETICS

G. H. SHULL, *Editor*

J. P. KELLY, *Assistant Editor*

(See also in this issue Entries 29, 47, 53, 74, 371, 375, 383, 506)

208. ALMQUIST, ERNST. Studien über *Capsella bursa-pastoris* (L.). II. [Studies on *Capsella bursa-pastoris* L. II.] Acta Horti Bergiani 7: 41-95. 16 fig. 1921.—Describes 200 species of *Capsella bursa-pastoris* based on the constancy of differentiating features when grown for two or three generations in the experimental garden. Unlike the author's earlier study in this genus, in which the classification was based chiefly on foliage characters, the forms described in the present paper are distinguished chiefly on the basis of form and size of capsules. The author notes that some natural crossing occurs, and promises a further contribution dealing with crossing and mutation in this genus. He groups the species into twelve classes, named as follows: (1) *Concaviformes*, (2) *Scolioticae*, (3) *Rubelliformes*, (4) *Corculatae*, (5) *Cordatae*, (6) *Otites*, (7) *Cuneolatae*, (8) *Triangulares*, (9) *Heterocarpae*, (10) *Lanceolatae*, (11) *Convexae*, (12) *Hiantes*; but these groups are not described and the figures do not allow a clear conception of their differentiating features. *Capsella apetala* Opitz, *C. integrifolia* Retzius, and *C. pinnatifida* Schlechtendal are found to occur associated with very diverse characters belonging in different groups. These are therefore not species nor constant varieties but mixtures of forms having different natural affinities.—*Geo. H. Shull.*

209. ALVERDES, FRIEDRICH. Rassenstudien an Fischen aus dem Carlsberg-Laboratorium in Kopenhagen. [Racial studies on fish from the Carlsberg Laboratory in Copenhagen.] Zeitschr. Indukt. Abstamm.- u. Vererb. 24: 167-169. 1920.

210. ALVERDES, FRIEDRICH. Die Vererbung von Abnormitäten bei Cyclops. [The inheritance of abnormalities in Cyclops.] Zeitschr. Indukt. Abstamm.- u. Vererb. 24: 211-278. 1920.

211. ANCEL, P. Sur l'hermaphroditisme glandulaire. [On glandular hermaphroditism.] Compt. Rend. Soc. Biol. Paris 83: 1642-1644. 1920.

212. ANONYMOUS. Families of the first born. Jour. Heredity 10: 160. 1919.—Notice of article by CARL E. JONES in Quarterly Publication of American Statistical Association for December, 1918.—*Howard J. Banker.*

213. ANONYMOUS. Genetical Society's visit to Reading. Gard. Chron. 68: 42. 1920.—Brief account of a visit of the Society to breeding and testing grounds of Sutton & Sons, Reading, England. Mention is made of crosses in dwarf beans, brassicas, marrows, sweet peas, sun flowers, etc., and this firm is stated to have one of the largest botanical collections of peas in existence.—*J. M. Shull.*

214. ANONYMOUS. [Rev. of: BATESON, W. Genetic segregation. Proc. Roy. Soc. London B, 91: 358-368. 1920. (See Bot. Absts. 8, Entry 226.)] Nature 105: 531. 1920.

215. ANONYMOUS. The inheritance of blindness. [Rev. of: BEST, HARRY. The blind: their condition and the work being done for them in the United States. 20 × 15 cm., xxi + 763 p. Macmillan Co.: New York, 1919. (See Bot. Absts. 3, Entry 231.)] Jour. Heredity 10: 211. 1919.

216. ANONYMOUS. The genetics of the Bonavist bean. [Rev. of: HARLAND, S. C. Inheritance in *Dolichos lablab*, L. Part 1. Jour. Genetics 10: 219-226. 1920. (See Bot. Absts. 7, Entry 1762.)] Gard. Chron. 69: 25. 1921.

217. ANONYMOUS. Rust resistance in wheat. [Rev. of: HAYES, H. K., JOHN H. PARKER, AND CARL KURTZWEIL. Genetics of rust resistance in crosses of varieties of *Triticum vulgare* with varieties of *T. durum* and *T. dicoccum*. Jour. Agric. Res. 19: 523-542. 6 pl. 1920.] Gard. Chron. 68: 295. 1920.

218. ANONYMOUS. The vehicles of hereditary qualities. [Rev. of: MORGAN, T. H. The physical basis of heredity. 14 × 21 cm., 305 p., 117 fig. J. B. Lippincott Co.: Philadelphia and London, 1919. (See Bot. Absts. 4, Entry 422.)] Nature 106: 103-105. 1920.

219. ANTHONY, R. La pseudo-hermaphroditisme tubaire chez les Cétacés mâles. [Pseudo-hermaphroditism in the male Cetaceans.] Compt. Rend. Acad. Sci. Paris 171: 1398-1399. 1920.

220. ARPS, GEORGE F. Polydactylism and the phenomenon of regeneration. Jour. Amer. Med. Assoc. 74: 873-874. 1920.—Polydactylism is not uncommon in man and has been known since antiquity. In some places as at Eycaux, France, the trait has come to prevail in a community. In the present instance an Alabama negro soldier, 21 years old, was observed to have an extra finger on the ulnar margin of each hand. The subject, whose mental age is given as 10.3 years, reported that his father, brother, 5 sisters and 2 nieces all showed the same trait. He also affirmed that his father had the supernumerary digits removed, since which time it has "been necessary to trim them off, as they grow continuously." This (unverified) statement is advanced as evidence of regeneration.—C. H. Danforth.

221. BALLY, WALTER. Die Godronschen-Bastarde zwischen *Aegilops*- und *Triticum*-arten. Vererbung und Zytologie. [The Godronian hybrids between species of *Aegilops* and *Triticum*. Heredity and cytology.] Zeitschr. Indukt. Abstamm.- u. Vererb. 20: 177-240. 4 fig. 1919.—In 1854 GODRON in Montpellier reported on the F₁ of a hybrid, *Aegilops ovata* × *Triticum vulgare*. Later he reported that he had secured from a back-cross with wheat—the pollen parent of the hybrid—a fertile hybrid that remained constant and bred true in subsequent generations. This he called *Aegilops speltaeformis*. The author (Bally) pollinated 250 *A. ovata* flowers with *Triticum vulgare* pollen, and secured two F₁ hybrid plants. From 80 reciprocal pollinations he secured three F₁ hybrid plants. These hybrids are figured and described, the two lots of F₁ plants being similar. The pollen of the F₁ plants was sterile, being devoid of starch and otherwise not normally developed. Both wheat and *Aegilops* pollen also failed to fertilize the flowers of the F₁ plants. The cytological study revealed that *T. vulgare* has 8, *A. ovata* 16, haploid chromosomes. The number of haploid chromosomes in the F₁ hybrid of these can sometimes be determined as 12. When more than 12 appear this excess number can be explained as arising through somatic divisions of excess chromosomes of the *Aegilops* parent remaining unpaired in the diakinesis. The difference in form of the plump *Triticum* and the slender *Aegilops* chromosomes is again apparent in the reduction division of the hybrid. In the mitotic division single chromosomes arising from wheat can be recognized, and it can be shown that these in the course of meiosis can cause irregularities, and that single cells are separated which have the chromatin in their nuclei made up exclusively from that of a single parent. Another species of *Aegilops*, probably *ventricosa* (earlier thought to be *speltaeformis*) had 6 haploid chromosomes.—C. E. Lighty.

222. BANNIER, J. P. [Dutch rev. of: HAGEM, OSCAR. Einige F₂ und F₃ Generationen bei dem Bastard *Medicago sativa* × *M. falcata*. (Some F₂ and F₃ generations of the hybrid *Medicago sativa* × *M. falcata*.) *Nyt Mag. Naturvidenskab.* 56: 149-165. 1919.] *Genetica* 2: 535-536. 1920.

223. BANNIER, J. P. [Dutch rev. of: (1) YAMPOLSKY, CECIL. Inheritance of sex in *Mercurialis annua*. *Amer. Jour. Bot.* 6: 410-442. *Pl.* 37-40, 1 fig. 1919. (See Bot. Absts. 4, Entry 827.) (2). IDEM. The occurrence and inheritance of sex intergradation in plants. *Amer. Jour. Bot.* 7: 21-38. 1920. (See Bot. Absts. 5, Entry 502.) (3). IDEM. Sex intergradation in the flowers of *Mercurialis annua*. *Amer. Jour. Bot.* 7: 95-100. 1 pl. 1920. (4). IDEM. Further observations on sex in *Mercurialis annua*. *Amer. Nat.* 54: 280-284. 1 fig. 1920. (See Bot. Absts. 6, Entry 750.)] *Genetica* 2: 554-556. 1920.

224. BANTA, ARTHUR M. Selection in *Cladocera*. [Abstract.] *Anat. Rec.* 20: 212. 1921.—Some years ago the writer undertook experiments in selection in parthenogenetic pure lines of *Cladocera* on the basis of a purely physiological character, reactivity to light. Sixteen lines were subjected to selection for various periods extending over from 18 to 196 generations. In 7 of these lines no difference appeared in reactivity between the 2 strains of the same line. In 2 lines slight divergences in reactivity were in the reverse of selection. These divergences, while not large, were fairly consistent. In 1 of these cases the divergence decreased as the experiment progressed. In 5 lines there was a possible effect of selection but the evidence is not considered conclusive. In 2 lines an effect of selection is rather clearly indicated. In 1 of these the divergence was not large and this case may be disregarded. But in the other the effect of selection is very large and is clearly substantiated. The divergence in this line appeared slowly and increased gradually until during the last months of the experiment the reaction time of the low strain was less than a third that of the high strain. The difference in reactivity to light was permanent or at any rate persisted for 32 months (112 generations) after selection was discontinued. Return selection was not attempted.—A 2nd series of selection experiments based on an entirely different character is now under way. The character used is the degree of intergradedness of sex intergrade strains of *Daphnia longispina*. Derived from a common progenitor and reproducing solely by parthenogenesis this would seem a most excellent material for a study of selection. Three strains were selected as high strains and 3 as low strains, the high and low strains being taken alternately from the 6 available sister strains. Selection was effective in each case, the individuals of the high strains becoming as high (i.e., as male) as they could be maintained with fair reproductive ability; and the low strains approaching very nearly the condition in which sex intergradedness is not apparent, i.e., most of the individuals showed no sex intergrade characters and the few intergrades were slightly affected. While the facts are as stated, environmental or other factors are influential to such an extent that the curves for the different strains fluctuate somewhat. Further, selection is not effective with equal promptness in every strain though in all cases it has ultimately been effective. Return selection is also effective. Through selection low strains have been derived from the selected high strains, and high strains from the selected low strains. Two strains have in turn been selected low strains, selected high strains, and selected low strains again.—Thus selection and return selection are equally effective with the amount or degree of sex intergradedness in *Daphnia longispina*.—Arthur M. Banta.

225. BARTSCH, P. Experiments in the breeding of *Cerion*s. *Carnegie Inst. Washington Publ.* 282. 55 p., 59 pl. Washington, 1920.—These land shells are extremely non-roving and are well adapted to breeding experiments in which isolation in different regions is a feature. Author planted four *Cerion* species from the Bahamas on the Florida keys. From several of the many colonies (usually containing 500 to several thousand marked shells) numerous first generation Florida-grown offspring have been obtained. In several cases lots of first generation offspring were transplanted and known second generation Florida-grown offspring secured. Differences in internal structural features in the different species

are pointed out and figured, but the characters utilized in comparing Florida-grown offspring with Bahama ancestry are shell characters. Differences in general coloration, mottling, and ridging of the shells are mentioned. The characters used as standards of comparison are numerical characters, numbers of whorls, altitude, and greatest diameter of the shell. A check series (100) of each of the species transplanted, and all the measured first and second generation Florida-grown offspring, are figured in plates and the individual measurements are all given in tables.—While in most of the series of first and second generation Florida-grown material one notes that the mean altitude is greater and the mean greatest diameter is less than in the original Bahama material, no great changes are seen in the means or in the ranges of variation of the characters studied. No biometrical treatment of data has been employed. The author concludes that the different species of *Cerion* seem to be quite stable within their normal limits of variation and appear to adhere to these limits even when subjected to a decidedly changed environment.—Hybrids were obtained between transplanted Bahama *Cerion viaregis* and the native Florida-key *Cerion incanum*. In shell measurements the author finds the hybrids intermediate and somewhat more variable than the parent species. In coloration, character of ridging, and general shape of shell the hybrids are extremely variable. Some are so mottled as very strongly to resemble the mottled *Cerion martensi* group; in general character of ribbing the range was from the relatively smooth *Cerion incanum* to the rough *Cerion viaregis*; the range in general form was likewise from the somewhat cylindrical *Cerion incanum* to the more conical *Cerion viaregis*. What is of even greater interest, these variations are independently combined in the hybrid offspring. Attention is called to cases in which species in a certain region are sometimes found to be extremely variable. "Prior to this year I was more and more inclined to the belief that we might possibly find that these very abundant and variable forms might represent new ingressions into a faunal area in which conditions for their existence were optimum to an unusual degree, where the normal death rate, due possibly to an absence of natural enemies, might be reduced, and where all the factors involved were inclined to favor the new arrival to the utmost, and that these factors and the necessarily reduced inbreeding might be responsible for the loosening of specific bounds and the producing of variants which, in the course of time, might result in a state of flux.—"Our *Cerion* experiments on Newfound Harbor Key, however, throw a new light upon the case, for here we have produced a state of flux by cross-breeding. There is no question that if we did not know the true inwardness of the *Cerion* complex as it exists at the present time in our colony upon this key, we would treat the material as we have treated such assemblages in the past; that is, as a very variable species. It therefore seems proper to assume that the converse should receive an equally favorable consideration, for it seems fair to believe that further breeding experiments will prove that such complexes are the product of cross-breeding.—A. M. Banta.

226. BATESON, W. Genetic segregation. Proc. Roy. Soc. London B, 91:358-368. 1920.—Segregation is a phenomenon which is not limited to particular classes or kinds of characters. The factors governing segregation of quantitative characters either do not segregate cleanly or the numbers involved are so large that their effects are not clearly shown. In many crosses involving quantitative characters, which appear to segregate cleanly, one or the other original type fails to reappear in its entirety. The author favors the first explanation suggested. Factor groups or complexes may sometimes segregate as units, sex determination and irregularities of inheritance in *Oenothera* are mentioned as being due to such a phenomenon. In other cases these complexes may break up and are then responsible for the appearance of mosaics of secondary sexual characters in fowls and different classes of color mosaics in the snapdragon and sweet pea. Linkage between factors conditioning the several character components of the mosaics is seldom evidenced and the question is raised if they are all distributed among different chromosomes. The author protests the general application of MORGAN's theory regarding crossing over and the limitation of linkage groups on the ground that it has been proven for only one case—*Drosophila*. The theory of linkage and crossing over has assumed much regarding the physical behavior of the chromosomes that cytology cannot substantiate. In plants the time of segregation is not limited to the reduc-

tion division as seems to be the case with animals. Cases are cited where the genetic constitutions of male and female cells of plants are so diverse that it cannot be accounted for by segregation during the reduction division. Cases of linkage values different for the male and female sex cells of the same plant are cited as exceptions to the ordinary mode of segregation. Evidence that somatic segregation may influence genetic potentialities is furnished by several citations in which root cuttings produce plants differing in some characters from the parent plant and from experiments upon rogues in peas. The author is led to believe that segregation of hereditary genes may occur at any division in the life cycle. [See also Bot. Absts. 8, Entry 214.]—*J. L. Collins.*

227. BENDERS. [Dutch rev. of: FLEISCHER, BRUNO, UND WILLIAM JOSEPHANS. *Ein Beitrag zur Frage der Vererbung der familiären Sehnervenatrophie (Leberscher Krankheit).* (Inheritance of familial atrophy of the optic nerve (Leber's disease).) Arch. Rass.- u. Gesellschaftsbiol. 13: 129-158. 5 pl. 1920.] *Genetica* 2: 532. 1920.

228. BENDERS. [Dutch rev. of: GROSS, K. *Über Vererbung von Augen- und Haarfarbe und den Zusammenhang beider.* (On inheritance of eye and hair color and the correlation between them.) Arch. Rass.- u. Gesellschaftsbiol. 13: 164-170. 1920. (See Bot. Absts. 8, Entry 266.)] *Genetica* 2: 534-535. 1920.

229. BLARINGHEM, L. *Stabilité et fertilité de l'hybride Geum urbanum L. × G. rivale L.* [Stability and fertility of the hybrid *Geum urbanum* L. × *G. rivale* L.] Compt. Rend. Acad. Sci. Paris 170: 1284-1286. 1920.—Author pollinated *Geum urbanum* with pollen of *G. rivale*, securing an F₁ generation of 3 uniform plants. These gave seed for an F₂ generation of over 100 plants, 41 of which were used as basis of author's account. He described F₂ group as uniform and lacking Mendelian segregation and considers this crossing as exemplifying his "*hérédité mixte*" (see Bot. Absts. 4, Entry 523). There was an average of about 25 per cent of imperfect pollen grains in F₂. Author considers this hybrid type as similar to *Geum intermedium* of taxonomists.—*James P. Kelly.*

230. BLISS, A. J. *Mendelian characters in bearded Irises.* Jour. Roy. Hort. Soc. 45: 289-292. 1919.—A record of several varieties of bearded *Iris* including combinations of *variegata* and *neglecta* types that tend to show that pigmented leaf base and brown-tipped beard are Mendelian in character, possibly single unit characters. Bliss finds, however, no apparent connection between these characters and color or type of flower. A cross of *variegata* by *amoena* gave no *squalens* colors and "it almost looks as if *amoena* and *variegata* were allelomorphous color varieties."—*J. Marion Shull.*

231. BONNEVIE. *Arvelighetsundersökelse i en norsk bygdeslaegt (Polydaktyli Tvillingfödsler).* [Investigations of inheritance in a Norwegian family pedigree (Polydactyly, birth of twins).] Videnskabselskab. Kristiania Forhandl. (1918). 1919.—A considerable number of individuals in southeastern Norway have six fingers on one or both hands, and often six toes on one or both feet. Sixth finger is on side of little finger. It appears to be a dominant character through successive generations. All go back to one man from Ringebu in Gudbrandsdal in middle of seventeenth century. Twins and triplets were numerous. Twin mothers in all cases known have both parents from lines of twin-producing families, that is, character appears to be recessive.—*A. Gundersen.*

232. BONNIER, GASTON. *Sur les changements, obtenues expérimentalement, dans les forms végétales.* [On the alterations obtained experimentally in the form of plants.] Compt. Rend. Acad. Sci. Paris 170: 1356-1359. 1920.—Observations on seventeen lowland species transplanted in same soil to high stations in the Alps and Pyrenees, which have come to resemble after period of 30 to 35 years typical alpine species of same genera. Particulars are given in each case. Author discusses briefly taxonomic problems raised by these results. He holds that facts favor Lamarckian hypothesis that environmental change is one of principal causes of transformation of organisms.—*R. E. Clausen.*

233. BRAINERD, EZRA, AND A. K. PEITERSEN. *Blackberries of New England. Their classification.* Vermont Agric. Exp. Sta. Bull. 217. 84 p., 36 pl. 1920.—A comprehensive report on the classification of the blackberries in which the authors conclude "that it is no longer a question of whether or not new species of blackberries are produced in the wild through natural hybridization but rather that it is a question whether hybridization is not the primary or only factor in the production of new species within this group." A more detailed discussion of the subject of spontaneous hybridization is to be published later but some of the more important facts are enumerated which have led to the conclusion that intercrossing of different species of blackberries is of common occurrence in the wild: 1. All New England forms show more or less infertility, none having been found 100 per cent fertile, while many almost sterile forms have been grown. This infertility is due largely to the impotence of the pollen.—2. Intermediate forms between all of the well recognized species exist in the wild.—3. Wherever an intermediate between any two forms of blackberries is found the two suspected parents usually can be located.—4. Plants of the blackberry sub-genus are very variable.—5. Seeds from selfed flowers of a number of suspected hybrids have been grown and these plants, in the majority of cases, show a reversion to the suppressed parent types.—6. A number of artificial crosses have been effected between different species. The plants from these crosses are almost identical with the suspected wild hybrids.—7. In more than 30 different combinations of New England blackberries that were cross-pollinated, not one failed to produce viable seed.—The authors point out that most of the characters which distinguish the different species of blackberries are quantitative, and the hybrids, therefore, nearly always show an intermediacy in the characters which are present in varying degrees in the parents. The offspring of such hybrids do not show segregation into dominants and recessives in the ordinary Mendelian ratios but all grades of intermediates are found. In some cases (*R. permixtus*, *R. frondisensis*, and *R. abbrevians* Blanchard) these hybrids appear to be more or less fixed.—J. H. Kempton.

234. BRIERLY, W. B. *Experimental studies in the specific value of morphological characters in the fungi.* Proc. Linnean Soc. London 1918: 55-56. 1918.—Pedigree cultures were made from single spores of *Botrytis*. The spore mode of a given culture from cabbage was found to be different when the organism was grown on tomato, and gave other modes for other substrata. A culture derived from onions when grown on cabbage differed in mode from that originating from cabbage. He concludes that the fungus consists of many elementary species or Jordanons which are morphologically distinct. He recognizes a "normal variation," present upon whatever host and characteristic of the elementary species, and a "modal" variation induced by the substratum. In nature the elementary species are usually on special hosts but saprophytically are of broad range. To determine an elementary species it is therefore necessary to isolate it and determine its "modal variation" on a series of standard media. Similar results and conclusions were had with *Penicillium* and *Stysanus*.—F. L. Stevens.

235. BROMAN, IVAR. *Das sogenannte biogenetische Grundgesetz und die moderne Erblichkeitslehre.* [The so-called biogenetic law and modern genetics.] Bergmann: München and Wiesbaden, 1920.

236. BUXTON, L. H. DUDLEY. *The inhabitants of the eastern Mediterranean.* Biometrika 13: 92-112. 1 pl. 1920.—The author deals with physical anthropology of ancient and modern Greeks, examining cephalic index, glabello-occipital length, greatest head breadth, upper facial index, nasal index, stature, and pigmentation. Significant difference in cephalic index between Lycian Greeks (80.27 ± 0.35) and those of Meligala in Messenia (82.49 ± 0.38), and of Cyprus (82.54 ± 0.11) are found; also between Cretans (79.26 ± 0.16) and Cypriots. High standard deviations indicate mixed population. Variability of Cretans dates from Middle Minoan times. Endogamous Lycian gypsies show standard deviation of cephalic index of only 2.83 ± 0.19 . There is no significant difference in coefficients of variation of head length and head breadth for the same group. For different districts head breadth is stable in Cyprus,

while head length is stable in Crete. For Crete stature of living adult males is 170.61 ± 0.26 cm. (175.26 ± 0.54 cm. for Selinos and Sphakia only); for Cyprus it is 168.77 ± 0.17 cm. Blue eyes are locally not uncommon, about 10 per cent in Albania and Cyprus, about 5 per cent in Crete. Pigmentation is apparently not definitely correlated with cephalic index. Lycian gypsies are only clear representatives of "Armenoid" race. Greeks are a mixture probably of early date of Mediterranean and Alpine types. No good ground appears for inferring Nordic blood.—*John Rice Miner.*

237. CARLE, E. Premiers travaux sur la sélection des riz du laboratoire d'étude des céréales à Saigon. [First work in selection of rice at the Saigon laboratory for the study of cereals.] Bull. Agric. Inst. Sci. Saigon 1: 74-87. 1919.—As preliminary work to the improvement of rice in Cochín-China, an agronomic study of 700-800 varieties of rice was made, resulting in the use of those varieties with more or less round kernels as better suited for the production of the finest rice. Selection from the second generation indicates a considerable improvement in the homogeneity of the grain; also a slight increase in the tillering capacity of the plants and in the weight of the grain. Certain strains also gave much greater yields than those used as checks, but in succeeding generations it was observed that this character was not constant. By comparing the yields of all strains in the preceding generations it seems possible in the third generation to classify those which appear most constant in heavy yield. In the fourth generation a certain number of choice strains can be isolated.—*Chas. R. Chambliss.*

238. CARLE, E. Sélection pédigrée appliquée à la variété local de riz Phung-tien. [Pedigree selection applied to the local rice variety known as Phung-tien.] Bull. Agric. Inst. Sci. Saigon 2: 26-32. 1920.—Pure line selections of rice variety Phung-tien made and tested at Experiment Station at Phu-my (Cochín-China). Five best lines selected from 100 grown during first year show greater uniformity and are otherwise superior to original variety. Data on number and weight of heads are presented.—*C. E. Leighty.*

239. CARLE, E. Sélection pédigrée appliquée à la variété de riz "Nàng-Mèo." [Pedigree selection applied to the variety of rice known as "Nàng Mèo."] Bull. Agric. Inst. Sci. Saigon 2: 73-75. 1920.—Improvement of rice variety "Nàng-Mèo" by selection is being attempted at Experimental Station at Phu-my (Cochín-China), according to methods described earlier in this bulletin (Vol. 1, 1920). Data on number and weight of heads of 4 lines for 3 years are presented. Nursery yields indicate commercial value of strains. Homogeneity of pure lines and characters differentiating them are noted.—*C. E. Leighty.*

240. COLLINS, E. J. The genetics of sex. Proc. Roy. Soc. London B, 91: 369-370. 1920.—Vegetative cultures from the monoecious moss, *Funaria hygrometrica*, made by removing the greater part of an archegonium, regenerated the typical monoecious gametophyte, unlike the vegetative cultures derived from antheridia and surrounding "perigonal leaves" of the same species which produce male plants only. Up to the point of the formation of the female organ, the cells of the haploid gametophytic phase retain the power to produce monoecious plants, whereas the leaves surrounding the male organ have lost this power.—*D. F. Jones.*

241. COLLINS, JULIUS L. Inbreeding and cross breeding in *Crepis capillaris* (L.) Wallr. Univ. California Publ. Agric. Sci. 2: 205-216. Pl. 39-41. 1920.—The naturally cross-fertilized wild plant, *Crepis capillaris*, when inbred, gives results similar to domesticated maize when so treated. The inbred plants compared with cross-bred ones show a slower rate of development during the entire period of growth. Some of the inbred strains exhibited partial pollen sterility. Complete absence of pollen was noted in one plant obtained from seed of wild plants growing in New Zealand. The maximum reduction appeared to be reached in the third and fourth generations. Inbred strains when crossed with non-inbred, produced vigorous, rapidly growing F_1 plants.—*D. F. Jones.*

242. CORRENS, C. Die Konkurrenz der männlichen und die weiblichen Keimzellen und das Zahlenverhältnis der beiden Geschlechter. [The concurrence of male and female germ-cells and the numerical relations of the two sexes.] *Naturwissenschaften* 6: 277-280. 1918.—The dioecious plant, *Melandrium*, when pollinated with a small amount of pollen gave a ratio of 737 pistillate to 555 staminate plants, and when a large amount of pollen was applied gave a ratio of 895 pistillate to 381 staminate. In the first case there were 43 per cent and in the second 30 per cent of staminate plants, showing that when the competition is keen the staminate-determining pollen nuclei are at a greater disadvantage, due to a slower growth of the pollen tubes carrying them. When the pollen is not in excess the slower-growing tubes have a better opportunity to fertilize, but even in those cases the sex ratio is not equal, a larger number of pistillate plants always resulting.—D. F. Jones.

243. CORRENS, C. Fortsetzung der Versuche zur experimentellen Verschiebung des Geschlechtsverhältnisses. [Continuation of experiments to shift the sex-ratio experimentally.] *Sitzungsber. Preuss. Akad. Wiss. Berlin* 1: 1175-1200. 3 fig. 1918.—In *Melandrium* there are ordinarily more female plants than male. The object of these experiments was to find means to alter the sex-ratio and thereby discover its determining factors. The method employed was that of varying the amount of pollen used in pollinations. There are about 350 ovules in an average capsule. When the amount of pollen applied is only slightly in excess of this number the resulting progeny shows an approximate equality of sexes (about 44 per cent males), but when a large excess (60,000 grains) is applied the proportion of males falls to about 32 per cent. This difference is about 8 times the probable error. The inference made is that there are two kinds of pollen—male-determining and female-determining—and that the second sort produces more active pollen tubes, which reach the ovules in advance of those of the male-determining sort. If a minimal amount of pollen is employed the female-producing tubes arrive first at the upper ovules and fertilize them leaving the slower male-determining ones to the lower ovules. Separating the seeds in the capsule into a lower and an upper portion confirmed this hypothesis by showing an excess of female plants from the upper seeds. It was also shown that female plants mature more quickly than males so that the proportion of males the first season was slightly lower than among the plants which lived over the winter and flowered the next season. Some experiments were also made showing that there is a differential mortality among pollen grains dried over sulphuric acid for 10 to 14 days. The male-determining appear to be weaker. Some apparently good seeds are always found incapable of further growth. Among seeds produced from old pollen this proportion is much larger, and in fact many of the embryos and ovules do not mature to the seed stage, dying at various stages.—Leonas L. Burlingame.

244. CORRENS, C. Zur Kenntnis einfacher mendelnder Bastarde. I. Die Unterscheidung der pilulifera-Homozygoten und der Heterozygoten des Bastardes *Urtica pilulifera* × *Dodartii*. II. *Mirabilis jalapa xantha* und ihre Bastarde. III. *Urtica urens peraeura*. [A contribution to the knowledge of simple Mendelian hybrids. I. Distinguishing the homozygote from the heterozygote of *Urtica pilulifera* × *Dodartii*. II. *Mirabilis jalapa xantha* and its hybrids. III. *Urtica urens peraeura*.] *Sitzungsber. Preuss. Akad. Wiss. Berlin* 1: 221-268. 1918.—Although the adult *pilulifera* homozygote and the hybrid are indistinguishable, as are also the cotyledon stages of the seedlings, yet the young plants can be distinguished by the character of the apices of the first 3 or 4 pairs of leaves. The tips of these first leaves show dominance of the *Dodartii* parent but in the later leaves the *pilulifera* parent appears to be completely dominant. As an explanation it is suggested that the *Dodartii* factor *D* becomes active earlier in ontogeny than the factor *P* which *pilulifera* has in addition to *D*, that is, *D* expresses itself only until *P* becomes active.—The *xantha* form of *Mirabilis jalapa* has only about 5 per cent as much chlorophyll as the normal (*typica*) form. *Chlorina* has about 30 per cent and *semichlorina* about 60 per cent of *typica*. *Variegata* has ground color of *chlorina* with full green flecks superposed. *Albomaculata* has leaves with white and green streaks and flecks. The amount of pigments was determined by comparison of crude alcoholic extracts of the same leaf area in some cases and of the same weight of leaves in others. *Chlorina* and *semichlorina*

show a proportional reduction of both chlorophyll and the yellow pigments. *Xantha* shows a slight increase of yellow with a large decrease of the green. *Xantha* survives only when grafted on green plants, when it sets seed. Various crosses were made with *typica*, *xantha*, and *chlorina*. The results are explicable on the assumptions: (1) That *xantha* possesses the factors ZZ for yellow pigments, (2) that *chlorina* has the formula ZZCCnn, and (3) that *typica* is NNCCZZ, where N is operative only when C is present. Four green genotypes, phenotypically alike, were identified as follows: (1) A type which when selfed gives 3 green to 1 *chlorina*, (2) a type which yields 9 *typica*: 3 *chlorina*: 4 *xantha*, (3) a type producing 3 *typica*: 1 *xantha*, and (4) homozygous *typica*. *Typica* × *chlorina* heterozygotes are only about 90 per cent as green as *typica* but heterozygotes of *typica* or *chlorina* with *xantha* are indistinguishable from the respective green homozygotes. *Urtica urens peraeura* is a yellow form which increases in green with age and is able to live independently. On account of its deficiency in chlorophyll it does not grow so rapidly nor to so great a size as the species. Selfing shows it to be a monohybrid which yields 2 greens to 1 *peraeura*. Satisfactory evidence has been secured to show that the 2:1 ratio arises through the failure of the yellow homozygote to live. A discussion is presented of the ratios to be expected in monohybrids when there is selective union of gametes, deficiency or excess of pollen, or inviable zygotic combinations.—*Leonas L. Burlingame*.

245. COULTER, MERLE C. Origin of mechanism of heredity. Bot. Gaz. 70: 459-464. 1920.—Author attempts to account for the evolutionary origin of the determiners (genes). He thinks they originated as by-products of metabolism. These by-products, he supposes, became isolated by anti-bodies and in later generations were released and induced the same kind of chemical changes as those of which they were the by-products.—*Edgar Allenburg*.

246. CROCKER, WM. Awn and barley yield. [Rev. of: HARLAN, H. V., AND S. ANTHONY. Development of barley kernels in normal and clipped spikes and the limitations of awnless and hooded varieties. Jour. Agric. Res. 19: 431-472. 1920. (See Bot. Absts. 6, Entry 1416.)] Bot. Gaz. 71: 77-78. 1921.

247. DANIEL, LUCIEN. Obtention d'une race nouvelle d'Asphodele par l'action du climat marin. [The appearance of a new variety of Asphodelus through the effect of a marine climate.] Compt. Rend. Acad. Sci. Paris 170: 1332-1333. 1920.—*Asphodelus luteus* originally obtained from Rennes has become remarkably modified after 20 years at Erquy. New form divided vegetatively and taken back to Rennes retained its acquired characters in full. Parallel sowings of seed of two forms reproduced differences exhibited by parents. Experiments are being continued. Author considers observations particularly significant for question of inheritance of acquired characters.—*R. E. Clausen*.

248. DEHORNE, ARMAND. Spermatogénèse de Corethra plumicornis et chromosomes eupyrrènes. [Spermatogenesis of Corethra plumicornis and eupyrene chromosomes.] Compt. Rend. Acad. Sci. Paris 171: 1399-1402. 1920.

249. DESMOULINS, A., ET V. VILLARD. The hybrid direct bearers in the valley of the Drome in 1919. Prog. Agric. et Vitic. (Ed. l'Est-Centre) 72: 62-65, 83-85, 114-116, 133-137. 1920.

250. DETLEFSEN, J. A. Genetic analysis of low crossover stock produced by selection. [Abstract.] Anat. Rec. 20: 211. 1921.—Following selection for low crossover values in red-eyed long-winged females (*Drosophila melanogaster*) heterozygous in white miniature, a stock was produced which has given crossover values of about 4-6 per cent for these 2 genes. The normal value used in plotting chromosome maps is 33 per cent. Matings of red long females from low crossover stock to white miniature males of normal stock gave F₁ females which show an intermediate value. When the F₁ sibs were mated inter se, the total F₂ results also showed an intermediate crossover value. However there was a distinct increase in the range of values.—Matings of red long males from low-crossover stock to eosin miniature females of normal stock gave similar results.—*J. A. Detlefsen*.

251. EAST, E. M. The rôle of reproduction in evolution. Amer. Nat. 52: 273-289. 1918.

—The rôle of methods of reproduction in evolution may be interpreted by comparing their effectiveness in offering selective agencies their raw material. Both asexual and sexual methods of reproduction occur in nearly all groups of animals and plants. In neither kingdom was sex developed as a more rapid means of multiplication; rather it fulfilled some other requirement. After origin of sex many changes in reproductive mechanisms occurred among plants, but almost all of them resulted in greater protection of the gametes, in increased assurance of fertilization, or in provision for better distribution, which may be interpreted as variations tending to perfect sexuality. Coincident with this, two important retrogressive developments occurred—apogamy and hermaphroditism—followed by evolution of methods of cross-fertilization, which seems to have been of immense advantage.—Essential evolutionary changes affecting reproduction in animals are strikingly similar to those in plants. Although asexual reproduction is found in most of the great groups of animals, it evidently did not meet all requirements since sexual reproduction is established in every phylum. Hermaphroditism is a secondary, not a primitive, phenomenon, and, as in plants, it was not found adequate. Further specialization resulted in mechanisms providing for mixtures of different germ-plasms.—Both animals and plants have adopted methods of reproduction which are identical in their essential features, something that can be said of no other life process. The significant feature is reduction of nuclear material in the gametes. This parallel evolution is of itself valid evidence of the importance of the process. For its interpretation compare sexual and asexual reproduction as an actual means for the transmission of characters. Extremely narrow variability of pedigreed inbred strains of *Nicotiana* and wheat indicate no higher heredity coefficient for sexual reproduction. Among animals it appears that the coefficient of heredity is as high for asexual as for sexual reproduction. But is this also true for germinal variation? It is believed the frequency of bud variations in higher plants propagated asexually shows that it is.—Even though there does not seem to be sufficient difference between sexual and asexual reproduction as regards variation frequency to make it a subject of experimental proof, certain theoretical points raise suspicion that there is such a difference. Parthenogenetic individuals having the haploid number of chromosomes should show proportionately more germinal variations than members of the same species having the diploid number of chromosomes, because both recessive and dominant variations should be recognizable in the former. That bud variations occur more frequently in heterozygotes than homozygotes means simply that bud variations are *detected* more frequently in heterozygotes because the majority of bud variations are retrogressive and therefore show only when the organism is heterozygous for the character affected.—The idea of МАУРАS, that continued asexual reproduction is impossible through some protoplasmic limitation, is rejected in favor of WEISMANN'S conclusion, that a mixture of germ-plasms offers sufficient advantages to account for everything, which idea finds its main argument in Mendelian heredity. If N variations occur in the germ-plasm of an asexually reproducing organism only N types can be formed to offer raw material to selective agencies. But if N variations occur in the germ-plasm of a sexually reproducing organism 2^N types can be formed. The advantage is almost incalculable. These advantages remain even though it should be shown later that the more fundamental and generalized characters of an organism are not distributed by Mendelian heredity. The majority of variations seem to be comparatively small, changes in detail, the very kind known to be Mendelian in their inheritance. The prime reason for the success of sexual reproduction is the opportunity it gives for mingling germ-plasms of different constitution and thereby furnishing many times the quantity of raw material to selective agencies that could possibly be produced through asexual reproduction.—Minor advantages accruing from asexual reproduction are, first, heterosis or hybrid vigor, which is best explained on the basis of linked dominant characters. Second, division of labor is made possible by secondary sexual characters in general, including those which separate the egg and the sperm. Finally, there is a presumable advantage in sex-linked characters, a mechanism contributing to the mixing of germ-plasms.—The essential feature of the rôle of reproduction in evolution is the persistence of mechanisms in both the plant and animal kingdoms which offer selective agencies the greatest amount of raw material.—E. B. Babcock.

252. ELDERTON, ETHEL M. On the inheritance of the finger-print. *Biometrika* 13: 57-91. 1920.—Historical sketch of GALTON's collection of finger-prints from 2300 persons and treatment of the material. The "natural order" of variation is discussed and the series "arch, small loop, large loop, composite, whorl" is provisionally adopted for the present investigation.—The data are first treated from the "Mendelian standpoint" and the results considered "unsatisfactory." They are then discussed more at length from the "biometric standpoint," and 102 distribution tables, comprising various relationships from parents to cousins, are presented and correlations determined by the method of "mean square contingency." The conclusion is reached that "it is extremely probable that finger-prints are inherited at the same rate as other physical characters, but the type characteristic of any finger in the parent, while most likely to pass to the like finger in the offspring, may easily pass to the homologous finger of the other hand or indeed to any other finger whatever, of the offspring." Inexplicably low values are obtained for the resemblance in finger-prints between cousins. The larger part of the Galton data is restricted to "forefinger" prints and is, therefore, insufficient for more than indications of the direction of research. To the heavier task of collecting "complete sets of family finger-prints . . . the Galton Laboratory is now addressing itself."—Howard J. Banker.

253. ENGLEDDOW, F. L. The inheritance of glume length and grain length in a wheat cross. *Jour. Genetics* 10: 109-134. 1 fig. 1920.—Results of a wheat cross between Polish (*Triticum polonicum* L.) and Kubanka (a variety of *T. durum* Desf.). Glume length and kernel length were studied. Glumes and kernels of Polish (P) were long while those of Kubanka (K) were short. F_1 was intermediate; F_2 gave no plants with as long glumes as Polish and none as short as Kubanka, that is, there was a "shift" toward a shorter Polonicum form and a longer Kubanka type. It was possible to distinguish the parental forms and they are found to follow the ratio of 1 long : 2 intermediates : 1 short. Grain length was also studied and behaved in a manner similar to glume length, and author concludes:—"(1) The one factor which governs the P - K glume difference also governs the P - K grain difference. (2) 'Shift' occurs, so that the P and K types as seen in F_2 (glume and grain) are numerically 'shifted' forms of the true F_0 type. The shifted values persist in F_3 . (3) In spite of the demands of the 'double-fertilization' theory, the grain appears, in so far as its length is concerned, to belong to the same generation as the plant on which it is borne, i.e., grain length is a maternal character and segregates on the 1 : 2 : 1 basis in F_2 ." And further that one factor controls: "(1) length of glume, (2) ribs on main lamina of glume, (3) shape of tip of glume, (4) curvature of keel of glume, (5) consistency of material of glume (P is 'papery,' K is more rigid), (6) length of grain, (7) shape and size of cross-section of grain, (8) the angle at which the embryo of the grain is set into the endosperm, (9) number and length of the hairs at the apex of the grain, (10) distinctness of the outline of the apical pad of the grain ('Gipfel-polster'—Kcke)." There is some relation between glume length and pubescence of the glume. The heavily pubescent types are also short-glume types.—It was considered that grain length is a maternal character although it is difficult to harmonize this with the double-fertilization hypothesis. Inheritance of hollow and solid straw seems complicated and it is indicated that there may be some relation between the glume-length inheritance and kind of straw.—H. H. Love.

254. FEDERLEY, HARRY. Beiträge zur Kenntnis der Säugetiergametogenese I. Die Spermatogenese von *Mus silvaticus* L. [Contribution to our knowledge of mammalian gametogenesis. I. The spermatogenesis of *Mus silvaticus* L.] *Acta Soc. Sci. Fennicae* 48: 5-37. 1 pl. 1919.

255. FIGINI, GUIDO. Intorno un cas di disgiunzione pigmentale in una infiorescenza di "Antirrhinum majus" L. [A case of pigmental disjunction in an inflorescence of *Antirrhinum majus* L.] *Riv. Biol.* 2: 3-5. 1920.

256. FRIMMEL, F. Notiz über Dominanzverhältnisse bei Fuchsienbastarden. [Note on dominance relations in *Fuchsia* hybrids.] *Zeitschr. Indukt. Abstamm.- u. Vererb.* 24: 279-281. 1920.

257. FRUWIRTH, C. Wicke mit linsenförmigen Samen. [Vetches with lens-shaped seeds.] *Zeitschr. Pflanzenzücht.* 7: 356-362. 1 fig. 1920.

258. GALIPPE, V. Nouvelles recherches sur la présence d'organismes vivants dans les cellules des glandes génitales mâles (microbiose, parasitisme normal ou accidentel). [New studies on the presence of living organisms in the cells of the male genital glands (microbiosis, normal or accidental parasitism).] *Compt. Rend. Acad. Sci. Paris* 169: 255-258. 1919.

259. GERBAULT, E. L. Hérités chez la Cymbalaire (première contribution). [Heredity in *Linaria cymbalaria*. First contribution.] *Bull. Soc. Linn. Normandie* VII, 2: 111-116. 1919.

260. GLASER, OTTO. Fertilization and egg-secretions. [Abstract.] *Anat. Rec.* 20: 227-228. 1921.—1. Egg secretions have been known for some time from the eggs of at least 10 species of echinoderms, 2 of annelids, 2 of tunicates, and 1 of molluses. To this list another mollusc, the oyster, and 2 vertebrates, the fish, *Fundulus heteroclitus*, and the frog, *Rana pipiens*, are added by the author.—2. The importance of these secretions in the initiation of development has been demonstrated by a variety of methods. One of these, that of washing the eggs, has been criticized because in the 18-36 hours required to remove all traces of their exudates the eggs themselves may undergo serious deteriorations of other sorts. By using running sea water, the author has succeeded in shortening this period to 3 or 4 hours, and by removing their jelly and exposing the eggs to charcoal, he has succeeded in sterilizing them completely in 30 minutes.—3. The secretions agglutinate spermatozoa and initiate development. These effects are due, not to 1 substance with 2 side-chains, as postulated in the Fertilizin Theory, but to 2 chemical entities, the lipolysin on the one hand, and the agglutinin, on the other.—4. The lipolysin is a lipolytic ferment and catalyses the hydrolysis of the esters of the lower as well as the higher fatty acids. It may be that more than 1 ferment is involved.—5. The agglutinin very possibly is also a ferment, but the process which it catalyses has not yet been found.—5. A study of the specificities of fertilization must take account of the lipolysin and of the agglutinin. With respect to the former, it is possible to employ lipolysins derived from the eggs of *Arbacia*, *Asterias*, and of the oyster, for the purpose of increasing the fertility of *Echinarachnius* eggs partially sterilized by the removal of their own secretions; with respect to the agglutinin, it is possible to increase very greatly the success of crosses between *Echinarachnius parma* and *Arbacia punctulata*, if one kind or the other of their sex cells, but especially the spermatozoa, is treated with species-true egg secretion prior to insemination. It appears therefore that the agglutination reaction involves specific features because species-true agglutinin has effects quantitatively and perhaps qualitatively different from those of heterogeneous agglutinins.—Whatever transformations views on the initiation of development may undergo within the next few years, the zone within which an understanding must be sought is now marked off by the reaction capacities of perfectly definite physiological compounds.—*Otto Glaser*.

261. GOLDSCHMIDT, R. Einführung in die Vererbungswissenschaft. Zwanzig Vorlesungen für Studierende, Aerzte, Züchter. Dritte neubearbeitete Auflage. [Introduction to the science of genetics. 20 lectures for students, physicians, breeders. 3rd revised edition.] 519 p., 178 fig. W. Engelmann: Leipzig, 1920.—See Bot. Absts. 8, Entry 336.

262. GOLDSCHMIDT, R. Der Mendelismus in elementarer Darstellung. [Elementary presentation of Mendelism.] 77 p., 15 fig. P. Parey: Berlin, 1920.—See Bot. Absts. 8, Entry 335.

263. GOLDSCHMIDT, RICHARD. Untersuchungen zur Entwicklungsphysiologie des Flügel-musters der Schmetterlinge. I. Mitteilung. Einige Vorstudien. [Investigations on the physiology of development of the color pattern of the wings in butterflies. I. Some preliminary studies.] *Arch. Entwicklungsmech.* 47: 1-24. 12 fig. 1920.

264. GOWEN, JOHN W. Studies in milk secretion. VIII. On the influence of age on milk yield and butter-fat percentage as determined from the 365-day records of Holstein-Friesian cattle. Maine Agric. Exp. Sta. Bull. 293. 185-196. 1920.—Author gives results of study of relation of age to milk yield and percentage of butter-fat, by which it is shown that yield of milk rises at an ever-decreasing rate until the age of $8\frac{1}{2}$ years, and then declines at an ever-increasing rate as age increases. Curves to fit the means of milk yield and butter-fat percentage are calculated.—*E. Roberts.*

265. GRAVES, R. R. A study of Guernsey breeding. Hoard's Dairyman 59: 1068, 1069, 1072. 1 fig. 1920.—Guernsey sires (166) were divided into 3 classes on basis of sires of production, sires of breeding daughters, and sires of breeding sons. These were traced back to foundation sires and numbers noted. 68.7 per cent of sires were produced by out-crossing, 19.3 per cent by line breeding, and 12 per cent by inbreeding. An attempt is being made to study inheritance of milk and fat. Relation of chromosome theory to facts observed in breeding dairy cattle is pointed out. No case of complete prepotency for production either in Guernsey or Holstein-Friesian breed was found. Variability in production of daughters, and its relation to judging quality of sire is considered.—*E. Roberts.*

266. GROSS, K. Über Vererbung von Augen- und Haarfarbe und den Zusammenhang beider. [On inheritance of eye and hair color and the correlation between them.] Arch. Rass.- u. Gesellschaftsbiol. 13: 164-170. 1920.—On the basis of a pedigree consisting of 4 grandparents, 5 each of the paternal and maternal fraternities, and 5 children the author proposes an hypothesis to account (1) for a brown-eyed child from two blue-eyed parents and (2) the association of blue eyes and brown hair and brown eyes and blonde hair as well as the more usual associations. There are: *P*, a ground-factor for iris pigmentation; *D*, a ground-factor for hair pigmentation; and *F*, an activating factor which affects pigment formation both in iris and hair. The application of this hypothesis to the family in question explains satisfactorily all of the observed combinations and distributions of eye and hair coloration.—[See also Bot. Absts. 8, Entry 228.]—*C. B. Davenport.*

267. GUYER, M. F., AND E. A. SMITH. Experiments with typhoid agglutinins in rabbits. [Abstract.] Anat. Rec. 20: 214. 1921.—Experiments are being conducted to determine whether immunization against germs of disease, practised generation after generation, will eventually result in a truly hereditary immunity. Rabbits may readily be sensitized with typhoid vaccine followed by the living bacteria so that their blood-serum diluted 320 to 640 times will agglutinate living typhoid bacilli. Females so sensitized may transmit to their young and even to their grand-descendants the ability to agglutinate typhoid bacilli in serum diluted from 60 to 160 times.—After 2 or 3 months of development the young of sensitized mothers are likely to show what appears to be a spontaneous rise of titre. If, for example, they have been averaging a titre of 80 for some time, it may rise to 120 or even 160. After a few weeks it drops back again. Rise of titre may be produced by the injection of milk into the blood-stream.—Young from a sensitized mother, when nursed by a normal mother, retain a fairly high titre for several months and may even show the spontaneous rise of titre mentioned. Young of a normal mother, when nursed by a sensitized mother, acquire a fairly high titre, presumably from the milk of the foster-mother, but lose it rapidly after weaning time.—*M. F. Guyer and E. A. Smith.*

268. HAGEM, OSCAR. Einige F_2 und F_6 Generationen bei dem Bastard *Medicago sativa* \times *M. falcata*. [Some F_2 and F_6 generations of the hybrid *Medicago sativa* \times *M. falcata*.] Nytt Mag. Naturvidenskab. 56: 149-165. 1919.—See Bot. Absts. 8, Entry 222.

269. HANSEN, W. Gedanken über Organisation und Arbeitersparnis in der Pflanzenzucht. [Thoughts on organization and labor saving in plant breeding.] Deutsch. Landw. Presse 1918: 261-262. 1918.—Author thinks that brief employment of young people does not further breeding industry, that use of the professor as superintendent deprives leaders in general of his knowledge which could be made available at breeding institutions, that the manag-

ing side should not become too extensive, that follow-up improvements be accompanied by reward of original breeder, that selections can often be reasonably limited and that a general testing of strains by public institutions is needed. [From anonymous review in *Zeitschr. Pflanzenzücht.* 6: 189. Dec., 1918.]—James P. Kelly.

270. HARLAN, HARRY V., AND H. K. HAYES. Occurrence of the fixed intermediate, *Hordeum intermedium* Haxtoni, in crosses between *H. vulgare pallidum* and *H. distichon palmella*. *Jour. Agric. Res.* 19: 575-591. 4 pl. 1920.—A barley, *Hordeum intermedium* Haxtoni, intermediate between typical 6-rowed and typical 2-rowed, has been known for many years and reported in literature as breeding true. Observations made since 1900 throw doubt on validity of fixed intermediates which bear lateral, fertile, unawned florets.—Authors crossed Manchuria and Svanhals varieties. Manchuria is typical 6-rowed and Svanhals has long-awned, central, fertile florets, and awnless, sterile, lateral ones. F_2 plants (87) produced F_3 families which were classified into 7 groups: (1) 22 plants, typical (phenotypical) 6-rowed; (2) 7 plants, lateral florets short-awned, highly fertile; (3) 25 plants, lateral florets awns short to pointed, fertility low; (4) 10 plants, lateral florets awns short to pointed, fertility nil; (5) 7 plants, lateral florets large, awnless, fertility low; (6) 11 plants, lateral florets awnless, fertility nil; (7) 5 plants, lateral florets small, awnless, fertility nil. Assuming a 2-factor hypothesis the following genetic analysis developed with the expected number of plants as indicated: (1) 22 plants homozygous for 6-rowed, $AA BB$, heterozygous for 6-rowed \times regressive 6-rowed, $AA Bb$, and homozygous for regressive 6-rowed, $AA bb$; (2) 11 plants heterozygous for 6-rowed \times *intermedium*, $Aa BB$; (3) 22 plants heterozygous for 6-rowed \times 2-rowed, $Aa Bb$; (4) 11 plants heterozygous for regressive 6-rowed \times 2-rowed, $Aa bb$; (5) 5 plants homozygous for *intermedium*, $aa BB$; (6) 11 plants heterozygous for *intermedium* \times 2-rowed, $aa Bb$; (7) 5 homozygous for 2-rowed, $aabb$. The 2 groups of 7 sub-groups correspond very well. The first sub-group in above groups is genetically complex. Factor AA is considered epistatic to BB and so all plants of group 1 are phenotypically identical. Evidence of presence of a third factor governing fertility is presented. Stability of *intermedium* form has been fully confirmed.—L. R. Waldron.

271. HERWERDEN, M. A. VAN. [Dutch rev. of: BROMAN, IVAR. Das sogenannte biogenetische Grundgesetz und die moderne Erblchkeitslehre. (The so-called biogenetic law and modern genetics.) Bergmann: München and Wiesbaden, 1920.] *Genetica* 2: 529-530. 1920.

272. HERWERDEN, M. A. VAN. [Dutch rev. of: MORGAN, THOMAS HUNT. The physical basis of heredity. 14 \times 21 cm., 300 p., 117 fig. J. B. Lippincott Co.: Philadelphia, 1919. (See Bot. Absts. 5, Entry 422.)] *Genetica* 2: 542-544. 1920.

273. HOGBEN, LANCELOT. The problem of synapsis. *Jour. Roy. Microsc. Soc.* 1920: 269-276. Sept., 1920.—A brief critical review of recent work on the chromosomes. The important point is made that there is not yet agreement concerning the origin of the chromosomes pairing in synapsis nor in the method of pairing. The author thinks that, in view of the uncertainty, emphasized by Miss DIGBY's recent papers, concerning the question whether the chromosomes that pair in the heterotypic prophase are homologous paternal and maternal chromosomes respectively or whether they represent only the daughter halves of a single somatic chromosome which splits in the telophase of the last sporogenous cell (DIGBY), "Such an attempt to provide an interpretation of partial linkage in Mendelian inheritance is exceedingly ambitious" on the basis of the chiasmotype theory of crossing over. The gist of the paper is contained in the conclusion that "While the chromosome hypothesis has proved a great incentive to research—particularly in the problem of sex—its major premise, the reality of synapsis, is in no way firmly established; further knowledge of the relation of chromosomes to the organization of the resting nucleus and a specialized study of individual heterotype chromosomes constitute, therefore, two of the most imperative needs of cytological theory today."—Leonas L. Burlingame.

274. HROMÁDKO, J. Die Variabilität der Nachkommenschaft derselben Futterrübenmutter in der 1. Generation. [The variability of progenies of single mother beets in the first generation.] Zeitschr. Zuckerindust. Böhmen 42: 581-601. 1918.—Author presents data on progeny of a single pedigree mother beet (fodder type) that had been isolated in gauze, and compares them with similar observations of ANDRLIK and URBAN on sugar beet. For fodder-beets coefficients of variability for weight of root, weight of foliage, dry substance of root, and sugar content were respectively 39.7, 35.0, 9.57, and 16.31. In case of sugar-beet the corresponding characteristics gave coefficients of variability, respectively, of 28.46, 32.4, 6.88, and 6.02. Author attributes greater variability of sugar content in former to fact that selection for that is much more recent. [From anonymous review in Zeitschr. Pflanzenzücht. 6: 189-190. Dec., 1918.]—James P. Kelly.

275. HUXLEY, JULIAN S. Note on an alternating preponderance of males and females in fish, and its possible significance. Jour. Genetics 10: 265-276. 1920.—In a stock of fish (*Girardinus poecilooides*), according to records of E. G. BOULENGER, the ratio of females to males for nearly a year was 3:1. Later, this ratio among the young produced changed to 2♀:3♂ for a few weeks, after which the numbers of the two sexes became approximately equal and remained so for several years. On the basis of this case and data from other sources, Huxley argues that the most probable explanation is to assume (1) that the male in this fish is the heterozygous sex having formula XY, the female being XX; (2) that a certain proportion of the individuals of genetic composition XY became *somatic* females (= feminized males), owing to the action of some unknown environmental influence; (3) that such "somatic" females produced X and Y eggs, which, by fertilization with X and Y spermatozoa, gave rise in the next generation to a preponderance of males (XY), the YY zygotes being assumed to be non-viable.—F. B. Sumner.

276. IRELAND, ALLEYNE. Democracy and heredity—a reply. Jour. Heredity 10: 360-367. 1919.—A brief summary of an article by the writer (Democracy and the accepted facts of heredity. Jour. Heredity 9: 339-342. 1918) is followed by a discussion of criticisms offered by EDWIN G. CONKLIN, MADISON GRANT, PRESCOTT F. HALL, O. F. COOK, and ROBERT CARTER COOK (see May and June, 1919, issues of Jour. Heredity). Author's attitude was that "with few exceptions, the best governed countries were those in which the mass of people had the least control over the administration of public affairs." His "dissent from the conventional view of democracy . . . as a sound, political principle was based upon four main considerations: (a) That the individual and not the mass has been the main source of human advancement; (b) that mental and moral traits in the individual are derived chiefly from heredity and not from environment; (c) that acquired characteristics are not inheritable;" and (d) that assortative mating, encouraged in a democracy, tends to drain the lower classes of talent and genius and increase these qualities in the upper classes. Discussing the criticisms he continues: "the real issue, when stripped of all dialectical trappings, is whether good government depends ultimately upon good human qualities or upon good political machinery. If it depends chiefly upon the former," as author seems to believe, "all discussions of government must be founded in biology." In defense of his postulate of assortative mating he presents data from the works of HAVELOCK ELLIS and FREDERICK ADAMS WOODS which show "that over a period of several centuries there has occurred a striking and progressive decline in the cultural contribution from the 'lower' classes" in the face of increasing democratic opportunity. He closes his discussion by a brief comparison of social conditions under several forms of government which is unfavorable to the democracy, and emphasizes the importance of drawing a distinction between "administration" and "policy."—Howard J. Banker.

277. KAPPERT, H. Untersuchungen über den Merkmalskomplex glatte-runzlige Samenoberfläche bei der Erbse. [Studies on the character-complex smooth-wrinkled surface of peas.] Zeitschr. Indukt. Abstamm.- u. Vererb. 24: 185-210. 5 fig. 1920.

278. KATHARINER, L. Die Entwicklungsgeschichte der digenetischen Trematoden und die Kontinuität des Keimplasmas. [The ontogeny of the digenetic trematodes and the continuity of the germplasm.] Zool. Anzeig. 51: 220-223. 1920.—Reiteration of view that sporocyst, redia, and cercaria are not individuals of distinct generations, but that all have been produced from cleavage cells of same fertilized egg. Life cycle does not therefore involve parthenogenesis nor true paedogenesis.—A. Franklin Shull.

279. KOHN, ALFRED. Der Bauplan der Keimdrüsen. [The structural plan of germ-glands.] Arch. Entwicklungsmech. 47: 95-118. 7 fig. 1920.

280. KOTOWSKI, FELIKS. Zmiennósé i Korrelacye w "czystej linii" pszenicy. Tr. vulgare Ostaka biala dublánska. [Correlation and variability in a pure line of wheat.] Polinusch: Tygodnika Rolniczy, Krakau, 1919.—Biometrical studies on 387 wheat plants. Coefficient of variability ranged from 7.06 per cent for length of stem to 43.07 per cent for weight of upper 20 cm. of stem in distributions that were found to be according to QUETELET's law. Correlation between stem length and weight of ear was only 0.20 ± 0.094 and author attributes little breeding value to stem length. Selection made with respect to weight of lower part of stem considered good. Correlation between ear weight and weight of lowest 20 cm. of stem was 0.75 ± 0.043 . Author does not ignore value of direct field selection in respect to non-lodging characteristic. [From anonymous German review in Zeitschr. Pflanzenzücht. 7: 333-334. Nov., 1920.]—James P. Kelly.

281. KRAFKA, JOSEPH, JR. Environmental factors other than temperature affecting facet number in the bar-eyed mutant of *Drosophila*. Jour. Gen. Physiol. 3: 207-210. 1920.—Following the author's previous work with temperature in producing a change in facet number of the ultra-bar mutant of *Drosophila melanogaster* various tests were made to determine the effect of other environmental factors. Certain consistent and apparently significant changes in facet number were obtained but they were of slight amount. Provided a consistent procedure is followed and plenty of moist food available, temperature seems to be the only environmental factor which need be considered in interpreting breeding data in *Drosophila*.—H. H. Plough.

282. KRAFKA, JOSEPH, JR. The post-embryonic development of the compound eye of *Drosophila melanogaster*. [Abstract.] Anat. Rec. 20: 231. 1921.—A histological study has been made of the development of the compound eye of *Drosophila melanogaster* Meig. The embryoblasts are present at the time of hatching, although the ommatidia are not completely metamorphosed until the late pupal period. The segmented condition of the optic ganglion, before definitive visual structures appear, suggests that the formation of the latter may be under the control of the nervous system. A marked reduction in the size of the optic ganglion in the bar-eyed mutant shows that the hereditary factor involves more than the facet number.—Joseph Krafka, Jr.

283. KRÜGER, PAUL. Studien an Cirripeden. [Studies on Cirripedes.] Zeitschr. Indukt. Abstamm.- u. Vererb. 24: 105-108. 13 fig. 1920.

284. KÜSTER, E. Beiträge zur Kenntnis der panaschierten Laubgehölze. [Variegation in broad-leaved trees.] Mitteil. Deutsch. Dendrolog. Ges. 28: 85-88. 8 fig. 1919.

285. LANCEFIELD, D. E. Two sex-linked lethals of simultaneous appearance in *Drosophila obscura*. Proc. Soc. Exp. Biol. Med. 17: 56-57. 1919.—Genetic data in *Drosophila obscura* indicate the simultaneous appearance of 2 sex-linked lethal factors in the same culture. Breeding tests show that these 2 factors are apparently located at opposite ends of a sex chromosome longer than that of *Drosophila melanogaster*.—H. H. Plough.

286. LAUGHLIN, HARRY H. Illustrating the structure and mathematics of the human germ-plasm. Jour. Heredity 11: 185-189. 1 fig. 1920.—A figure and description of "an abacus"

consisting of a board with 2 rows of independently revolving spools, suitably labelled, by which the various combinations of genes in two paired chromosomes may be illustrated.—*H. J. Banker.*

287. LA VAULX, R. DE. L'intersexualité chez un Crustacé Cladocère: *Daphne Atkinsoni* Baird. [Intersexuality in a crustacean Cladocera, *Daphne Atkinsoni* Baird. *Compt. Rend. Acad. Sci. Paris* 169: 97-99. July, 1919.

288. LILLIE, FRANK R. The initial event in fertilization. [Abstract.] *Anat. Rec.* 20: 225. 1921.—The initial event in fertilization has a primary significance because all others depend for their occurrence upon it and for their degree of efficiency upon its quantitative value. The initial event also displays a high degree of simplicity in relation to subsequent events.—Two new methods of study are applied in this paper to its study: First, the effect of copper salts upon the fertilization reaction; second, a comparison of the relative degrees of specificity between sperm agglutination by egg secretions and the fertilization reaction itself.—Copper has an incomparably greater effect on the initial reaction in fertilization than on later stages of *Arbacia*. It may therefore be used for an analysis of this reaction. The results indicate the presence of a copper-avid substance in the cortex of the egg that is responsible for activation.—The specificity of sperm agglutination by egg secretions between 2 species of *Strongylocentrotus* is found to be of the same order as fertilization specificity.—The copper-avid substance of the cortex of the egg is to be identified with the sperm-agglutinating substance of egg secretion and with the fertilizin of previous papers.—*Frank R. Lillie.*

289. LOTSÝ, J. P. Eenige resultaten van het Oenotherajaar 1920. [Some results of the Oenothera year 1920.] *Genetica* 2: 481-528. 57 fig. 1920.

290. LOTSÝ, J. P. [Dutch rev. of: HONING, J. A. Erfelijkheidsleer zonder Evolutie theoriën. Rede uitgesproken bij de aanvaarding van het Hoogleeraarsambt aan de Landbouwhoogeschool te Wageningen 23 Nov. 1920. [Genetics vs. theories of evolution. Lecture given on assuming the office of Professor at the Agricultural School of Wageningen Nov. 23, 1920. H. Veenman: Wageningen, 1920.] *Genetica* 2: 536-537. 1920.

291. LOTSÝ, J. P. [Dutch rev. of: TÄCKHOLM, G. On the cytology of the genus *Rosa*. A preliminary note. *Svensk Bot. Tidskr.* 14: 300-311. 3 fig. 1920. (See Bot. Absts. 7, Entry 243.)] *Genetica* 2: 547-554. 1920.

292. McCLUNG, C. E. The chromosomes in fertilization. [Abstract.] *Anat. Rec.* 20: 228-229. 1921.—1. The process of fertilization consists essentially in the introduction into the egg of a simplex series of chromosomes, duplicating the series left there by oogenesis. Little or no other material is carried by the spermatozoön.—2. Since genetic experiments indicate the equivalence of male and female in heredity, the importance of the chromatin is demonstrated.—3. Behavior of characters in inheritance, indicating factor differences and groupings, are paralleled by conditions of structure and behavior of the chromosomes.—4. The chromosomes introduced by the spermatozoön are reduced to the smallest volume and contain chromatin in the most condensed condition.—5. The chromatin quickly absorbs fluid from the egg cytoplasm and forms a nuclear vesicle in which the chromosomes later appear in the size, form, and number that marked them in the spermatid.—6. Upon union of the egg and sperm pronuclei the paternal chromosomes may remain distinctly grouped and this segregation may be followed through many generations of cells.—7. The individual paternal chromosomes may be traced into the body cells of the embryo and are found later in the germ cells.—8. During the many generations between the ovum and the adult organism in which maturation occurs, the chromosomes have reproduced themselves, each time under different conditions in the organization and constitution of the body, so that in the germ cells they must emerge somewhat different in character from what they were on entering.—9. At the period of maturation in the germ cells, however, the homologous elements from the two

parents unite in the most intimate manner but without the loss of their individual identity, thus completing the process of union inaugurated by fertilization.—10. Still, distinguished by characteristics of form, size and behavior, they are then segregated by chance and distributed again into mature germ cells in a simplex series. Through these they may be traced again into another generation of organisms where they repeat the series of processes.—11. Fertilization, although not necessary to reproduction, and omitted in parthenogenesis, is required in biparental inheritance and there serves the essential purpose of introducing the necessary duplicate control factors—the chromosomes.—*C. E. McClung.*

293. MACCURDY, M. Conjugation and fission-rate in *Arcella vulgaris* (Ehrenberg). [Abstract.] *Anat. Rec.* 20: 199. 1921.—In pedigreed cultures of *Arcella vulgaris* under laboratory conditions the fission rate varies considerably. A general average rate in a non-conjugating line derived from 1 parent cell was 1 division for every 2.56 days. At times when estimated for weekly periods, the fission rate for any one line would increase for a period giving a higher rate and this would be followed by a period of slower divisions. The rate in a parallel line might not be the same.—Conjugation was most often found to occur at times of low fission rate. In many cases this was found to occur at intervals of about a month. There are exceptions. Many ex-conjugants gave a higher rate of division for a period following conjugation than parallel lines gave for the same period. Some non-conjugants gave a higher rate than some ex-conjugants. Certain nuclear conditions are pointed out and their probable significance considered.—*M. MacCurdy.*

294. MACOUN, W. T. Apple breeding in Canada. *Proc. Amer. Pomol. Soc.* 1917: 11-27. 1 pl., 1 fig. 1918. [See *Bot. Absts.* 7, Entry 985.]

295. MALAQUIN, A. Reproduction sexuée et reproduction asexuée. [Sexual and asexual reproduction.] *Compt. Rend. Acad. Sci. Paris* 171: 1403-1406. 1920.

296. MARCHAL, E. Recherches sur les variations numériques des chromosomes dans la série végétale. [Studies on the numerical variations of the chromosomes in plants.] *Mem. Acad. Roy. Belgique Cl. Sci.* 4: 1-198. [Year?]

297. MASSART, J. La notion de l'espèce en biologie. [The notion of species in biology.] *Bull. Cl. Sci. Acad. Roy. Belgique* 1920: 366-381. 4 fig. 1920.—The classic definition of species according to the author, does not correspond to the Linnean species, nor even to the Jordanian species, but to the line.—A good example of the line is furnished by *Quercus ilex*. The nuts of a tree are similar. They often differ from one tree to another, but often a little group has the same type of nuts. Each tree gives every year the same form of nuts. The young plants show that the nuts of a single tree are similar, but they differ from those of another individual. Each tree has in the young stage more spiny leaves. There are many other examples of stable lines in wild species. In the definition of the line, it is necessary to include neither self-fertilization nor homozygous. In fact, some self-sterile lines (*Lolium perenne*), and some heterozygous lines (*Primula insecta*) are known. The taxonomist and the biogeographer should content themselves provisionally with Linnean and Jordanian species. The lines have three origins: Hybridization, generative mutation, and vegetative mutation.—*Henri Micheels.* (Translated by *Geo. H. Shull.*)

298. MATHEWS, J. WRENFORD. Sheep and wool for farmers. Cross-breeding experiments. Results of lamb-raising trials. *Agric. Gaz. New South Wales* 31: 761-770, 846-852. 10 fig. 1920.

299. MEVES, FRIEDRICH. Eine neue Stütze für die Plastosomentheorie der Vererbung. [A new support for the plastosome theory of heredity.] *Anat. Anzeig.* 50: 551-557. 2 fig. April, 1918.—Author offers evidence, based upon studies of fertilization of egg of nematode *Oxyuris*, that plastosomes or "plastrochondria" are introduced into egg by spermatozoon; and that they, together with similar bodies from egg, are portioned out to first two daughter cells of zygote, and presumably play a part in heredity as well as the nuclei.—*F. B. Sumner.*

300. MOON, VIRGIL H. Heredity as a factor in the etiology of neoplasms. *Medical Rec.* 97: 14-16. 1920.—Author records an autopsy on a man who died of carcinoma of the bladder. This man's brother, father, grandfather, and one uncle had likewise died of carcinoma.—He also cites a case of a man who died of pneumonia. The father, brother, and one uncle had each died of cancer. The deceased man had no evidence of cancer, but revealed on autopsy a well developed carcinoma of the stomach.—A short review is given of the observations and statistics of WILLIAMS, BUTLIN, MUNN, WARTHIN, EWIN and MAUD SLYE on the heredity of cancer and other tumors in man and other animals. The conclusion is reached that a tumor-producing potentiality is an hereditary trait and that the conditions which are assigned by pathologists as possible causes of cancer probably act merely as exciting or determining factors in individuals who have received a tendency to the neoplastic type of growth as a heritage from their ancestors.—*Geo. N. Papanicolaou.*

301. MOORE, CARL R. Sex-gland transplantation and the modifying effect in rats and guinea-pigs. [Abstract.] *Anat. Rec.* 20: 194. 1921.—In the white rat, testicular tissue grafted into young, spayed females, will persist for a period of nine months. Associated with the testicle graft the behavior of the animal is decidedly male-like.—Ovaries transplanted into young, castrated males will persist and grow for several months. Such an animal, as an adult, exhibits a maternal behavior towards the young. Somatic differences between male and female are too slight to be of value in a differential diagnosis of maleness or femaleness.—In guinea-pigs, ovaries grafted into young, castrated males persist for several months and are accompanied by certain somatic modifications in the male; the teats of the mammary glands hypertrophy and compare favorably in size with those of pregnant females, though little or no secretion could be expressed. Psychical modifications of the male are not, in the author's experience, subject to modification.—Testicular tissue grafted into young, spayed females can be recovered nine months later. No mature sperm were present in the seminiferous tubules but active mitoses were common in cells of the germinal epithelium, a considerable amount of which may remain. Females bearing such testicle grafts exhibit the characteristic male sex behavior (psychical modification) and the external genitalia appear male-like (somatic modification).—In the white rat ovarian grafts will persist for eight months in a male with 1 normal testicle. Graafian follicles continue their development normally up to the maturation period of the ovum. Subsequently the follicles undergo atresia without ovulation.—There appears to be no deleterious influence of secretions from either sex gland upon the opposite one.—*Carl R. Moore.*

302. MORGAN, T. H. The effects of castration of hen-feathered Campines. *Biol. Bull.* 39: 231-247. 10 fig. 1920.—Completely castrated hen-feathered male Campines develop normal male plumage.—*H. D. Goodale.*

303. MORGAN, T. H. The effects of ligating the testes of hen-feathered cocks. *Biol. Bull.* 39: 248-256. 11 fig. 1920.—Ligation of the testes, if sufficient to cause complete degeneration of the testes, results in assumption of male plumage by hen-feathered adult cocks.—*H. D. Goodale.*

304. MORGAN, T. H. The genetic factor for hen-feathering in the Seabright Bantam. *Biol. Bull.* 39: 257-259. 1920.—Additional data are given, but without settling definitely whether one or two factors are involved, and proof is presented that the character is not sex-linked.—*H. D. Goodale.*

305. MULLER, H. J. Further changes in the white-eyed series of *Drosophila* and their bearing on the manner of occurrence of mutation. *Jour. Exp. Zool.* 31: 443-473. 3 fig. 1920.—Three new mutations of the *W* gene in the X chromosome of *Drosophila* are described, the characters produced being ecru, a straw color, ivory (found by A. H. STURTEVANT) and a new white. In addition an orange-eyed male appeared which did not transmit its mutant eye color. A consideration of the manner in which these characters appeared suggests that the mutations which produced them occurred at various times,—the first in a late oögonial cell or

oöcyte, the second in an early stem cell of the ovary, and the third in the early cleavage of the individual in which it appeared. It is possible that the orange eye arose by a mutation of the *W* gene in a somatic cell of the early embryo. The commonly accepted view that mutations are more likely to occur in gametes or germ cells near the period of maturation receives no support from the data on this series. It is shown, however, that there is a much greater chance that any mutation will show itself in a single individual than in several. Further study of the allelomorphs of the white-eye series suggests other important conclusions with respect to the origin of mutations. Since mosaic mutants involving recessive sex-linked genes are always males, it would appear that mutations occur in only one member of a pair of chromosomes at any one time. If the event which produces a mutation is so localized as to affect a single locus in only one of a pair of homologous chromosomes it seems unlikely that the artificial influencing of the kind of mutation is a possibility. It is further noted that the variations of the *W* gene are not random deviations for they are all in a definite direction, and the extreme variants seem to be the more common. For this reason selection if concerned with this locus alone would not be cumulative.—*H. H. Plough.*

306. MULLER, H. J., AND E. ALTENBURG. A study of the character and mode of origin of eighteen mutations in the X-chromosome of *Drosophila*. [Abstract.] *Anat. Rec.* 20: 213. 1921.—Since the 18 mutants found in the experiment of the writers on mutation frequency were non-selected or random samples of (detectable) mutants in the sex-chromosome, a study of them furnishes quantitative data bearing on the nature of mutations. (1) All were lethals or sub-lethals. Of the 5 sub-lethals, 4 produced morphological abnormalities. (2) All were completely recessive except 1 mutant of the yellow-mouse type. (3) Half of the loci involved are crowded into the 1.5 units space to the left of white eye (the rest being scattered rather evenly). This indicates that this region of the chromosome is really much longer than the map represents. (4) All the lethals gave negative tests for "deficiency," hence deficiencies are evidently much rarer than ordinary lethal mutations. (5) Three lethals were allelomorphs of known non-lethal factors, and 2 of these lethals were allelomorphs of each other. Of the latter 1 became dominant in its lethal effect when crossed to a non-lethal allelomorph. (6) Lethals very near 'duplicated' loci remained unaffected by the 'duplication.' (7) Mutation occurs with not markedly different frequency in the 2 sexes, for 7 of the lethals were found in the maternal, 11 in the paternal chromosome. (8) These mutations occur not only near maturation, but also in earlier germ cells, in either sex, as shown by the original appearance of some of the lethals in 2 sisters simultaneously. (9) Two of the original mutant individuals contained 2 different lethals at once; in 1 case these were in opposite chromosomes, in the other case in the same chromosome.—*H. J. Muller and E. Altenburg.*

307. NEWMAN, H. H. The experimental production of twins in the starfish *Patiria miniata*: with a discussion of the causes of twinning in general. [Abstract.] *Anat. Rec.* 20: 190-191. Jan. 20, 1921.—A series of separate twins and of double monsters were produced under 3 different experimental conditions: (a) As the result of an extremely belated parthenogenetic development; (b) as the result of fertilizing *Patiria* eggs with the sperm of another species of starfish; (c) as the result of overcrowding normally fertilized eggs. All 3 methods involve retardation of development, with loss of precise axiate organization at some critical period. Redifferentiation or resumption of axiate organization occurs, but unity of organization has been lost, so that 2 or more axes or gradients appear instead of the original 1. Thus twins or double structures arise.—A series of twin types are produced which represent the results of differences in the earliness of onset of retardation and more or less complete recovery. The series includes completely separated half-sized and quarter-sized blastulae and gastrulae, full-sized gastrulae, full-sized gastrulae with 2 or more archentera, larvae in which the archenteron branches anteriorly into "dicephalous" larvae, and advanced bipennariae with paired, instead of only left-hand, madreporic pores and pore-canals. This physiological theory of twinning agrees with the writer's formerly expressed theory to explain the cause of specific polyembryony in the armadillo.—*H. H. Newman.*

308. OKKELBERG, PETER. The early history of the germ cells in the brook lamprey, *Entosphenus wilderi* (Gabe), up to and including the period of sex differentiation. [Abstract.] Anat. Rec. 20: 201. 1921.—The germ cells are segregated before the germ layers are definitely established. They are first recognized about the time when the mesoderm separates from the entoderm (embryo about 191 hours old). The definite germ cells, in both sexes, take their origin from these primordial germ cells, and from no other source. Numerous germ cells degenerate in every individual and they never take part in the formation of somatic structures. During the period of sex differentiation 2 types of cells are found in practically every individual, those which continue to divide and those which stop dividing and enter upon a synaptic and growth phase. The former are taken to be potential male cells (spermatogonia) or indifferent cells and the latter potential female cells (primary oöcytes). The relative proportion of the 2 kinds of cells apparently determines whether the larva shall become a male or a female. Observations seem to warrant the conclusion that each larva carries in it the potentiality of both sexes and that sex, therefore, is not irrevocably fixed at or before fertilization. When a larva becomes definitely established as a male there rudimentary eggs are frequently found in the adult testis. In the adult condition the number of individuals of each sex is about the same.—*Peter Okkelberg.*

309. ORENSTEEN, MYER M. Correlation of cephalic measurements in Egyptian born natives. Biometrika 13: 17-24. 1920.—Means, standard deviations, and coefficients of correlation of length and breadth of head are given for different provinces. Correlation ranges from $+0.208 \pm 0.033$, to $+0.369 \pm 0.028$.—*John Rice Miner.*

310. OSLER, H. S. Origin and development of pedigreed varieties of grains. Michigan Acad. Sci. Ann. Rept. 21: 139-143. 1919.—Important varieties of small grains came into use largely in three ways, introduction, selection, and hybridization. The origin of a number of improved varieties is given. The method of production and the distribution of Red Rock wheat and Rosen rye is briefly summarized.—*H. K. Hayes.*

311. PELSENEER, PAUL. L'hybridation chez les Mollusques. [Hybridization in molluscs.] Compt. Rend. Acad. Sci. Paris 168: 1056-1059. 1919.

312. PÉZARD, A. Loi du "tout ou rien" ou de constance fonctionnelle, relative à l'action du testicule considéré comme glande endocrine. [Law of "all or nothing" or of functional constancy relative to the action of the testis considered as an endocrine gland.] Compt. Rend. Acad. Sci. Paris 172: 89-92. 1921.

313. PÉZARD, A. Secondary sexual characteristics and endocrinology. Endocrinology 4: 527-540. 2 fig. 1920.—A number of secondary sexual characters are dependent upon internal secretion of testis. Effect of secretion begins at puberty and continues, in poultry, through sexual life with remarkable constancy. Effect is lost with removal of testis, but not more than $\frac{1}{10}$ of total weight of testis is required to produce effect. Any fraction of testis large enough to produce any morphogenetic effect produces the entire effect (tested on combs). Some characters recognized as racial are dependent on this secretion. Meat diet produces modification in structure and sexual behavior, not directly, but by first inducing changes in testis.—*A. Franklin Shull.*

314. PLAHN-APPIANI. Die Individualität von Zucker- und Futterrübe. [Individuality of sugar beets and fodder beets.] Centralbl. Zuckerindust. 27: 220-221. 1919.—Author refers to doubt sometimes expressed about distinguishing certain white fodder beets from sugar beets. He would not ascertain sugar content as this is transgressive in its variation but would use a criterion dependent on structural characteristics as specific weight or data on volume secured in calculation of specific weight. The volume figures for sugar beet lie between 92 and 95 and for fodder beets from 97 to over 100.—*James P. Kelly.*

315. P[OPENOE], P. A contribution to eugenics. [Rev. of: DUNLAP, KNIGHT. Personal beauty and racial betterment. C. V. Mosby Co.: St. Louis, 1920.] Jour. Heredity 11: 258. 1920.

316. P[OPENOE], P. Eugenics made easy. [Rev. of: HUMPHREY, SETH K. The racial prospect. 261 p. Charles Scribner's Sons: New York, 1920.] Jour. Heredity 11: 237. 1920.

317. P[OPENOE], P. A French student of the birth-rate. [Rev. of: RAGEOT, GASTON. La Natalité. (Natality.) 296 p. Ernest Flammarion: Paris, 1918.] Jour. Heredity 11: 237. 1920.

318. P[OPENOE], P. A text book of biology. [Rev. of: SHULL, A. FRANKLIN, GEORGE LA RUE, AND ALEXANDER G. RUTHVEN. Principles of animal biology. 16 X 24 cm., ix + 441 p., 245 fig. McGraw-Hill Book Co.: New York, 1920.] Jour. Heredity 11: 214. 1920.

319. PUNNETT, R. C., AND P. G. BAILEY. Genetic studies in poultry. II. Inheritance of egg-colour and broodiness. Jour. Genetics 10: 277-292. 1 pl., 11 fig. 1920.—Reciprocal crosses between Brown Leghorns which are not broody and lay white eggs and Black Langshans which are broody and lay brown eggs, also crosses between the Langshans and Gold-Pencilled Hamburgs, were made with the following results.—Egg color:—Leghorn ♀ X Langshan ♂: F₁, intermediate; F₂, nearly half white, the rest tinted, but mostly lighter tints. Reciprocal cross: F₁, as before; F₂, all shades represented, but curve slightly bimodal. Langshan ♀ X Hamburg ♂: F₁, as before; F₂, all grades represented and curve distinctly bimodal. The results in this case are explained on the basis of a major factor for egg pigment and several minor factors all of which are thought to be present in the Langshans and absent in the others.—Broodiness: Leghorn ♀ X Langshan ♂: F₁, broody; F₂, 19 broody, 47 non-broody. Langshan ♀ X Leghorn ♂: F₁, broody; F₂, 8 non-broody. Langshan X Hamburg: F₁, slightly broody; F₂, 4 broody, 34 non-broody.—H. G. May.

320. RICHET, CHARLES. La sélection humaine. [Human selection.] 8°, 262 p. F. Alcan: Paris. 1919.

321. RICHET, CHARLES, ET HENRY CARDOT. La transmission héréditaire des caractères acquis et l'accoutumance des microbes. [The hereditary transmission of acquired characters and the tolerance of the microbes.] Compt. Rend. Acad. Sci. Paris 171: 1353-1358. 1920.

322. RIDDLE, OSCAR, AND ELLINOR H. BEHRE. On the relation of stale sperm to sterility and sex in ring-doves. [Abstract.] Anat. Rec. 20: 211. 1921.—The very abnormal sex ratios obtained from hybrid birds by several investigators require the study of all factors possibly concerned. Practical work in pigeon hybridization also sometimes requires a knowledge of the length of time the sperm may remain alive in the female oviduct. On the latter point, it is found that the spermatozoa of the ring-doves (mostly fully fertile hybrids of closely related species) used retained their fertilizing power during very nearly 8 days, reckoned from the time of isolation of the male to the hour the egg is laid.—“Staleness” of the spermatozoa did not appreciably affect the sex ratio in 213 individual tests made with a dozen pairs of birds. The degree of staleness was known in each test. Some of the sex ratios obtained during the experiment cannot be considered normal but these abnormal ratios have been shown to be associated with other factors investigated earlier. The abnormal sex ratios that have been obtained in previously reported investigations on these doves, and any results that may be later obtained from them or from similar birds, are here shown to be not complicated by effects due to staleness of the spermatozoa.—Oscar Riddle and Ellinor H. Behre.

323. RIOLLE, Y. TROUARD. Les hybrides de Raphanus. [Raphanus hybrids.] Rev. Gén. Bot. 32: 438-447. Fig. 1-3. 1920.—The author previously studied hybrids of *R. Raphanistrum* with varieties of *R. sativus* and found superficial homogeneity in F₁ and visible dissociation in F₂. She now attempts to demonstrate that while F₁ is homogeneous

as a whole, individual plants themselves are extremely variable. Reciprocal hybrids of *Raphanistrum* and *sativus* were highly vigorous and gave comparable results under a variety of conditions. F_1 flowers as a rule were white, but there were exceptions, especially in later blossomings. One plant had one twig white-flowering and one yellow-flowering. In later blossomings some flowers were observed with two petals white and two yellow and some flowers showed tinges of rose or violet at end of blooming period. Structure of silique seemed to be intimately connected with color of flower and varied within wide limits on hybrid plants, the limits on parents being much narrower. Sugar content was high and starch low in the hybrids as in radishes, a condition contrary to that in *R. Raphanistrum*. In character of anthocyanin radishes may be divided into 3 groups: Rose or red; violet; black, gray or white. Red \times black or gray gives violet. Red \times yellow gives violet, but with dissociation, which indicates that yellows are themselves hybrids. Red \times violet gives violet, but the author considers dominance of violet here simply a matter of concentration of violet pigment, for a mixture of solutions of red and violet anthocyanin gives violet solution. In F_2 every possible combination of parental characters occurs as regards color of flower, structure of silique, and root development; but there are all sorts of intermediates, and types which appear to return to those of parent are not identical with them. It is argued that this demonstrates that MENDEL'S law is only a directive one. From her studies of F_1 populations the author concludes that law of uniformity of F_1 is not absolute. She favors NAUDIN'S idea that the hybrid is a living mosaic of more or less discordant elements which may at times visibly dissociate in F_1 individuals. She argues that everything connected with life is mobile and changing and that it is practically impossible to generalize from particular bases. MENDEL'S law does not, therefore, approach the validity of a mathematical law.—*R. E. Clausen.*

324. ROBB, WILLIAM. Plant breeding experiments at the University of St. Andrews (Conducted by the late John H. Wilson). *Scottish Jour. Agric.* 3: 391-402. 2 pl., 2 fig. 1920.—Dr. WILSON was responsible for the establishing of extensive plant-breeding experiments in Scotland. The accomplishments of the last four years preceding his death have not been previously published. During these years he grew many thousands of hybrid potato seedlings and had reduced his stocks to 240 selected varieties. In a cross of Sandy and Golden Rain oats the F_1 and F_2 plants all had more or less one-sided panicles while both parents have open spreading panicles. In the F_2 progeny of a cross between Daubeney and Huskless oats were types with two awns to the spikelet and an articulation suggestive of the wild oat, *Avena fatua*.—*H. V. Harlan.*

325. ROBERTS, E. A note on inheritance of polydactylism in cattle. [Abstract.] *Anat. Rec.* 20: 211. 1921.—A normal bull mated to a polydactylous cow produced a polydactylous female. This daughter produced, from matings to a normal bull, 3 calves all of which showed the polydactylous condition.—*E. Roberts.*

326. ROBERTS, HERBERT F. Yellow-berry in hard winter wheat. *Jour. Agric. Res.* 18: 155-169. 2 fig. 1919.—See Bot. Absts. 6, Entry 32.

327. ROBERTSON, W. R. B. Further studies on inheritance of color in the turkey. [Abstract.] *Anat. Rec.* 20: 213-214. 1921.—The pattern of the black variety is allelomorphic to the pattern of the bronze. Black is almost, not entirely, dominant, there being usually about 6 bronze feathers widely distributed. F_1 black (bronze) σ^7 back-crossed to his bronze dam gave 50 per cent of F_2 bronze and 50 per cent black. An F_1 black (bronze) φ by a bronze σ^7 gave the same result. The bronze of F_2 , mated inter se, gave only bronze, the F_1 blacks gave black and bronze.—Black is likewise allelomorphic to the bourbon red and the Narragansett patterns. A bourbon red φ by the F_1 black (bronze) σ^7 gave 50 per cent bronze-red intermediates, like F_1 of the bronze by red cross, and 50 per cent a rusty black. An F_1 black (bronze) φ by a bourbon red σ^7 gave 50 per cent bronze-red intermediate and 50 per cent rusty black. The latter shows a slight trace of barring with white in the primaries. A Narragansett φ by an F_1 black (bronze) σ^7 gave 50 per cent black and 50 per

cent bronze.—The last cross shows also that the Narragansett pattern is probably allelomorph to bronze. Narragansett is also likely allelomorph to bourbon red. Reciprocal crosses gave F_1 much like the Narragansett but with subterminal black bands less intense and slaty regions slightly auburn.—These 4 patterns evidently form a system of quadruple allelomorphs.—White is recessive to color. A white ♀ by a bourbon red ♂ gave F_1 all bronzed intermediate; she evidently carried bronze but lacked the factor for color. Bronze ♀ by white ♂ gave bronze. F_2 was 75 per cent bronze and 25 per cent white.—W. R. B. Robertson.

328. ROBERTSON, W. R. B. Unusual tetrads and their bearing on the problem of crossing-over. [Abstract.] Anat. Rec. 20: 199. 1921.—Among the ring-like tetrads resulting from the pairing of compound chromosomes, such as occur in *Chorthippus curtipennis*, there have been found again cases of a condition in which the 2 strands of 1 of the members of a pair show 1 complete revolution about each other which is not present in the strands of the other member of the pair. This torsion occurs, of course, in a region of the tetrad where disjunction has taken place—that is, at an internode between 2 points of the tetrad which are still in conjunction.—This may mean: (1) That the pairing chromosomes were each split and the halves independently twisted about each other before parasynapsis took place; or (2) that crossing-over between 1 strand of each of the conjugants has taken place at some previous time.—If the latter be the correct interpretation, then opposite sides of the ring would each receive 1 strand of the paternal and one of the maternal pair, and the 1st division be accordingly equational for the bulk of the tetrad.—The important point, however, is that the crossing-over hypothesis gives a very satisfactory explanation of the abnormality.—W. R. B. Robertson.

329. RYX, GEORG VON. Methoden einer exakten Prüfung des Fortschrittes bei der Zuckerrübenzucht. Paritäts- und doppelte Standard-methode. [Methods of exact testing the advancement in sugar-beet breeding. Parity and double standard method.] Zeitschr. Pflanzenzücht. 7: 227–237. 1920.—Author discusses need for constant standard by which to judge results of progress in sugar beet breeding, explaining that one lot of seed cannot be kept for that purpose because of its deterioration in storage. He explains two standards and how to secure them: (1) Parity method, or method of direct comparison with standard beet specimens, in which a line is bred pure and maintained pure for purposes of comparison. (2) Double standard method, or method of comparison with a corrected and doubly checked standard, in which half the seed from each season is planted in turn the next two seasons.—H. B. Tukey.

330. SAKAMURA, T. Experimentelle Studien über die Zell- und Kernteilung mit besonderer Rücksicht auf Form, Grösse und Zahl der Chromosomen. [Experimental studies on cell and nuclear division with special reference to form, size, and number of chromosomes.] Jour. Coll. Sci. Imp. Univ. Tokyo 39¹: 1–221. 7 pl., 24 fig. 1920.—The paper is chiefly of interest to cytologists but the following conclusions are important for geneticists. Chromosomes were found normally to be constant in number and to retain their identity. Constrictions produced by attachment of spindle fibers were found to be of wide occurrence in plants and animals and to serve as excellent marks of identification of particular chromosomes. Fragmentation sometimes occurs at constrictions and increases the chromosome number. Such fragmentations become heritably fixed and give rise to varieties with deviating chromosome numbers. Such abnormalities, as well as those due to failure of particular pairs to segregate, are brought about by conditions in surrounding cytoplasm and are the effects of outer or inner factors which may also produce mutation by direct action on the germ-plasm. Nearly related species and varieties of some genera, e.g., *Triticum*, differ by multiples of the x or reduced number characteristic of the ancestral species. Fragmentation, failure to segregate (non-disjunction), inclusion of two or more nuclei in one cell or one membrane may be produced by physical or chemical means or by influence of parasites. Author did not secure normal development of pollen grains with such unusual chromosome equipment.—Leonas L. Burlingame.

331. SCHIEMANN, E. Zur Frage der Brüchigkeit der Gerste—eine Berichtigung. [On the question of brittleness in barley—a correction.] Zeitschr. Indukt. Abstamm.- u. Vererb. 21: 53. 1919.—A correction of a misstatement in an earlier paper, due to a typographical error, and a reply to a criticism of the author's interpretation of the inheritance of brittleness of rachis in barley crosses.—C. B. Hutchinson.

332. SCHMIDT, JOHS. IV. The genetic behaviour of a secondary sexual character. Compt. Rend. Trav. Lab. Carlsberg 14: 1-12. 6 pl. 1920.

333. SCHRADER, FRANZ. Peculiar chromosomal phenomena in a Homopteran. [Abstract.] Anat. Rec. 20: 200-201. 1921.—In *Pseudococcus nipae*, a Homopteran, both sexes have a diploid number of 10 chromosomes. In the female, 5 tetrads are formed and reduction results in the haploid number of 5 chromosomes as in the ordinary manner. In the male, the growth stages of the spermatocytes show 5 of the 10 chromosomes condensing in advance of the remaining chromosomes. These 5 chromosomes can be identified in following stages by the tendency to remain in a more or less clumped group. No trace of tetrad formation could be found. The 1st spermatocyte division is equatorial and 10 chromosomes go to each pole. The 2nd division is reductional and this apparently takes place in that the 5 clumped chromosomes go to one, and the remaining 5 to the opposite pole. Early spermatids still show 5 chromosomes and the formation of spermatozoa seems to follow ordinary lines.—Franz Schrader.

334. SCHULTZ, WALTHER. Kälteschwärzung eines Säugetieres und ihre allgemeinbiologischen Hinweise. [Darkening of a mammal by cold and its general biological significance.] Arch. Entwicklungsmech. 47: 43-75. 12 fig. 1920.

335. SIRKS, M. J. [Dutch rev. of: GOLDSCHMIDT, R. Der Mendelismus in elementarer Darstellung. [Elementary presentation of Mendelism.] 77 p., 15 fig. P. Parey: Berlin, 1920.] Genetica 2: 532-533. 1920.

336. SIRKS, M. J. [Dutch rev. of: GOLDSCHMIDT, R. Einführung in die Vererbungswissenschaft. Zwanzig Vorlesungen für Studierende, Aerzte, Züchter. Dritte neubearbeitete Auflage. [Introduction to the science of genetics. 20 lectures for students, physicians, breeders.] 3rd revised ed., 519 p., 178 fig. W. Engelmann: Leipzig, 1920.] Genetica 2: 533-534. 1920.

337. SIRKS, M. J. [Dutch rev. of: HERIBERT-NILSSON, NILS. Ein Übergang aus dem isogamen in den heterogamen Zustand in einer Sippe der *Oenothera Lamarckiana*. (A transition of the isogamic to the heterogamic condition in a strain of *Oenothera Lamarckiana*.) Hereditas 1: 213-220. 1920.] Genetica 2: 545-546. 1920.

338. SIRKS, M. J. [Dutch rev. of: MALINOWSKI, EDMUND. Die Sterilität der Bastarde im Lichte des Mendelismus. (The sterility of hybrids in the light of Mendelism.) Zeitschr. Indukt. Abstamm.- u. Vererb. 22: 225-235. 1920.] Genetica 2: 540-542. 1920.

339. SKUPIENSKI, F.-X. Sur la sexualité chez une espèce de Myxomycète Acrasiée *Dictyostelium mucoroides*. [On sexuality in a species of Acrasidae *Dictyostelium mucoroides*.] Compt. Rend. Acad. Sci. Paris 167: 960-962. 1918.

340. STEINACH, E. Verjüngung durch experimentelle Neubelebung der älternden Pubertätsdrüse. [Rejuvenation through experimental revitalization of the senile sex glands.] Arch. Entwicklungsmech. 46: 557-619. 9 pl., 7 fig. 1920.—By the use of two methods, viz., section of the vas deferens and transplantation of gonads, Steinach has brought about rejuvenescence in senile rats. Great care was used to make sure that the rats were really senile before each experiment was begun. Histological examinations of the testes were made. After section of the vasa deferentia, a multiplication of Leydig's cells took place, accompanied by a return to the normal vigorous condition of rats in the prime of life. The span of life of these rats exceeded the normal by about 25 per cent. A rejuvenescence also was observed in 3 old men on whom similar operations were performed. Transplantation of testes and ovaries gave like results.—H. D. Goodale.

341. STURTEVANT, A. H. **The vermilion gene and gynandromorphism.** Proc. Soc. Exp. Biol. Med. 17: 70-71. 1920.—MORGAN and BRIDGES (Carnegie Inst. Washington Publ. 278. 1919) conclude from a study of gynandromorphs that the somatic appearance of any part of the body is due to its own chromosomal constitution. A gynandromorph obtained by the writer indicates that this is not true for all factors. The father of the gynandromorph carried several sex-linked characters including vermilion, none of which were present in the mother. The whole head of the gynandromorph was male in constitution, since it showed all the sex-linked characters of the father except vermilion. It is apparent therefore that the vermilion eye color is not determined by the genetic constitution of the eye pigment cells but by that of some other part of the body.—H. H. Plough.

342. TENNENT, DAVID H. **Chromatic material in hybridization.** [Abstract.] Anat. Rec. 20: 229. 1921.—Closeness of relationship is by no means indicative of the readiness with which the initial impulse to development may be received, nor a sure criterion of the extent to which it may proceed. Some species hybridize in nature; some eggs show a cortical block which may be removed readily by various methods. The entrance of a spermatozoön following the removal of the cortical block may result in development, or it may result in an instantaneous, or in a slower but none the less complete cytolytic of the egg.—In some crosses, in which a specialized type of development is superimposed on a more general type, development proceeds regularly up to the point of deviation of special from general. Internal block may become effective apparently at any stage after the entrance of the spermatozoön. Many degrees of inhibition, ranging from failure of the germ nuclei to unite to failure of synapsis, have been described, but no methods of overcoming its effects have been devised.—From our knowledge of straight-fertilization and of cross-fertilization we have come to look upon development as an attribute of the egg. In eggs of *Arbacia* fertilized by sperms of *Möira*, an interordinal cross, a rhythmic appearance of basophilic bodies in the cytoplasm may be seen. A similar phenomenon has been described in many species-fertilized eggs. By the application of binuclearity hypotheses, founded in part on the chromidial hypothesis, to the metazoan cell, these basophilic bodies have been explained as somatochromatin or trophochromatin. The evidence for the emission of chromatin as such from the nucleus is not convincing. In the conditions of the experiment mentioned, a foreign enzyme was introduced. Its presence produced a coalescence of granules into coarsely dispersed aggregates. It is suggested that this coalescence is a result of dehydration due to the activity of the foreign enzyme in the cytoplasm. These bodies are regarded as synthesized in the cytoplasm. We cannot hope to distinguish between more than very widely spaced steps in synthesis within the cell by methods of staining. The egg and spermatozoan may form a harmonious system, the degree of harmony being a function of cytoplasmic substrate and nuclear enzyme.—David H. Tennent.

343. UBISCH, G. VON. II. **Beitrag zu einer Faktorenanalyse von Gerste.** [Contribution to a factorial analysis of barley.] Zeitschr. Indukt. Abstamm.- u. Vererb. 20: 65-117. 7 fig., 11 diagrams. 1919.—The results of barley hybridization experiments to determine gametic formulae for nine characters, are given. On the factor basis the conclusions are as follows: (1) Brittleness of rachis; two factors both of which must be present in either homozygous or heterozygous condition in order to produce brittleness. The character is, however, affected by moisture conditions at maturity and by the physiologically correlated laxity of spike. (2) Length of rachis internodes; one or more lengthening factors may be present. In *Hordeum spontaneum* three are present in homozygous condition. (3) Sterility of side florets; two factors involved but no data are given. (4) Awn length—there is one lengthening factor A. A alone or modified by presence of either of two other factors gives awn length of common barleys. All three present in homozygous condition produce wild awn type. If A is absent, shorter awns result due to the modifying effect of the other factors. (5) Hoods,—either one or two factors act in conjunction with A, the factor for long awns. Alternative interpretations are offered of the peculiar case of long awns appearing in F₂ generation in crosses between hooded and short-awned forms. Data are cited showing linkage between factors for long awn and laxness of spike; similarly for short awn and density of spike. (6) Culm length,

—height of culm is governed by presence of one or more of three possible factors. Data are given showing linkage between tall culms, long awns, and lax spike. (7) Hulllessness of kernel, (8) color of glumes, and (9) type of basal bristle are each due to a single genetic factor difference.—*F. P. Bussell*.

344. VEIT, OTTO. Studien zur Theorie der vergleichenden Anatomie. (Die Rolle der Ontogenie in der Phylogenie.) [Studies on the theory of comparative anatomy. The rôle of ontogeny in phylogeny.] Arch. Entwicklungsmech. 47: 76-94. 1920.

345. WALTHER, AD. R. Sammelreferat, betreffend einige neuere Arbeiten über die Vererbung quantitativer Eigenschaften. [Composite review of a few recent works on the inheritance of quantitative characters.] Zeitschr. Indukt. Abstamm.- u. Vererb. 24: 282-289. 1920.

346. WHITING, P. W. The production of mosaic males from fertilized eggs in Hymenoptera. [Abstract.] Anat. Rec. 20: 210. 1921.—An orange-eyed mutation in the wasp, *Hadrobracon*, acts as a complete recessive to the normal black. Inheritance is "sex-linkoid," the males being haploid and usually parthenogenetically produced. Heterozygous females, isolated as virgin, produce black and orange males in equal numbers. When orange males are mated to black females all offspring are black. In reciprocal mating, daughters are black and most of the sons are orange. A few of the sons, however, are black, showing that they come from eggs into which the black-bearing spermatozoon has penetrated. Such anomalous blacks have in some cases bred like black, showing that gonads, as well as eyes, are paternal in origin. Others have bred like orange, showing that, while eyes are paternal, gonads are maternal. Orange-eyed brothers of anomalous blacks have bred like normal orange, except that in 1 case such a male bred like a black. Any one male when bred to orange female produces either black or orange daughters, never both, showing that gonad is haploid and either paternal or maternal in origin.—*P. W. Whiting*.

347. W[OODS], F. A. The meaning of continuous variation in color. Jour. Heredity 11: 84-86. 1 fig. Feb., 1920.—A plate of 20 specimens of the beetle *Rhynchophorus cruentus* showing a "perfectly continuous graduation in a color pattern," with brief textual comment.—*H. J. Banker*.

348. WOODS, FREDERICK ADAMS. A definition of heredity—"Nature vs. Nurture" not a good expression. Jour. Heredity 10: 426-427. Dec., 1919.—The lack of "scientific definiteness" is pointed out in the terms "nature" and "nurture" because of the many senses in which the words are used, and the use of the expression "heredity" is criticized for the same reason.—*Howard J. Banker*.

349. WOODS, FREDERICK ADAMS. Portraits of early Americans. Jour. Heredity 10: 212-222. Fig. 13-18. May, 1919.—A "Review and supplementary research based upon 'The Founders: Portraits of Persons Born Abroad Who Came to the Colonies in North America before the Year 1701' by Charles Knowles Bolton." The writer believes he finds evidence from this collection and other portraits that there has been a progressive change in the physiognomy of the Nordic race from the mongoloid to the deep-set eye and in other characters.—*Howard J. Banker*.

350. YAMAGUCHI, YASUKE. Kurze Mitteilung über die Beziehung der Aufblühzeit und des Sitzes der Blüte am Rispenaste zum Korngewichte des Reises. [Brief report on the relation between flowering time and position of the flower on the inflorescence to seed weight in rice.] Bot. Mag. Tôkyô 34: 136-139. 1 fig. 1920.

351. YAMAGUCHI, YASUKE. Über die Beziehung der Aufblühzeit und des Sitzes der Blüte am Rispenaste zum Korngewichte des Reises. [The relation of flowering time and the position of the flower on the inflorescence to seed weight in rice.] Ber. Ohara Inst. Landw. Forsch. 1: 451-517. 35 fig. 1919.

352. YASUI, KONO. **Genetical studies in *Portulaca grandiflora*.** Bot. Mag. Tôkyô 34: 55-65. Pl. 1 (colored), fig. 1. 1920.—Crosses are described between single and double races belonging to 7 color types. Doubleness is dominant. Yellow is due to a yellow flavone derivative, which in the presence of a reducing factor *R* yields a magenta anthocyanin. White races lack either the chromogen factor *C* alone or both *C* and *R*. Yellow single by white single $CCrr \times ccRR$ gives magenta $F_1 CcRr$ and F_2 by selfing of 9 magenta, 3 yellow, and 4 white. Hybrid double magentas $CcRrDd$ by white singles $ccRRdd$ give magenta doubles, magenta singles, white doubles, and white singles in equal numbers. By yellow single they give equal numbers of yellow and magenta ($CcRrDd \times CCrrdd = 1CCrRdD : 1CcRrDd : 1CCrrdd : 1Ccrrdd : 1CCrrDd : 1CrrDd : 1CCrrdd : 1Crrdd$). Double whites $CcRrDd$ by pale yellow singles $CCrrdd$ give equal numbers of magenta and yellow doubles and singles. Single scarlet by double white gives magenta double, which mated to single white gives equal numbers of magenta and white doubles and singles. The selfed singles from this give singles only; the selfed doubles, 3 doubles to 1 single. The single mated to the doubles give 1 : 1 ratio.—L. L. Burlingame.

353. ZELENY, CHARLES. **The direction and frequency of mutation in a series of multiple allelomorphs.** [Abstract.] Anat. Rec. 20: 210-211. 1921.—Full eye, bar eye, and ultra-bar eye in *Drosophila melanogaster* constitute a series of multiple allelomorphs with decreasing facet number and increasing dominance. Bar arose from full and ultra-bar from bar. Observations were made of the direction and frequency of mutation within pure stocks of the members of the series. In the full-eye stocks no mutations to bar or ultra-bar were observed during a period of 6 years among 46,290 counted individuals and among a much larger number of uncounted ones. On the other hand, the reverse mutation from bar to full occurred 52 times among 84,159 individuals or once in 1618, and from ultra-bar to full 5 times out of 8681, or once in 1736. Correspondingly there were only 3 mutations of bar to ultra-bar, including the original mutant, among 84,159 individuals or 1 in 28,053, while the reverse mutation of ultra-bar to bar occurred 3 times in 8681 or once in 2894 and was observed also at another time when the number of individuals examined was not being recorded. Selection for high and low facet number had no effect upon the frequency of any of the mutations.—In this allelomorphic series therefore (1) reverse mutations are much more frequent than the original ones, (2) original progress to ultra-bar is through bar but reversion may go back directly to full as well as through bar, and (3) the frequency of mutation is independent of upward and downward selection.—Charles Zeleny.

354. ZINN, JACOB. **On variation in Tartary buckwheat, *Fagopyrum tataricum* (L.) Gaertn.** Genetics 4: 534-586. 11 fig. 1919.—This publication records the results of a study of a highly variable, ever-sporting race of *Fagopyrum tataricum* Gaertn. discovered by the author. A strain was isolated which produced a large number of flowers with supernumerary carpels, the number of carpels varying from the normal 3 to as high as 25. The frequency of abnormal flowers as a rule decreased with increase in number of carpels. In those flowers having more than 6 carpels there was a tendency for an even number of carpels to occur more frequently than an odd number. Associated with the abnormal gynoecea are abnormal perigones with segments varying from the normal 5 to as high as 18. There is some correlation between abnormal number of carpels and abnormal number of perigone segments. The proportion of abnormal flowers in a given race depends on the environment and is very constant under a given set of environmental conditions. The condition of nutrition had little or no effect on this ratio but high temperature and humidity seemed to increase the proportion of abnormal flowers. Selection for 5 years had no effect on the ever-sporting race. The greatest abnormal development occurred on the 3 lower branches and in the basal region of the terminal raceme. Other variations noted, which seemed to be of the same type, were floral proliferations, often giving rise to syncarpous fruits and fasciation of vegetative parts.—T. O. Sprague.

355. ZINN, JACOB. **Wheat investigations. 1. Pure lines.** Maine Agric. Exp. Sta. Bull. 285. 49 p., 3 pl., 8 fig. 1920.—In 1916, 259 pure lines of wheat were planted at Aroostook

Farm. These had been taken from local fields devoted to following varieties or groups: Red Fife, Preston, Bluestem, Marquis, Canada Red (Ladoga), unnamed, and durum. In 1917 these were reduced to 91. Seven pure lines secured from Minnesota were added. These were Marquis, Bluestem, Preston (Velvet Chaff), Royalton (red and white), and two durums. Minnesota lines showed 19 per cent increase in kernel weight when grown one year in Maine. No further increase was secured.—Preston kernels from Minnesota lines showed slight tendency to yellow berry while similar tendency in durum was very strong when grown under Maine conditions.—Variations in yield among various pure lines were rather marked.—Minnesota pure lines showed but slight loss in crude protein content, except durum lines which showed marked loss. Taking the 40 pure lines grown and analyzed in 1917 and 1918, the correlation coefficient of protein content was 0.381 ± 0.092 .—Certain Red-Fife lines gave satisfactory yields and best baking results. Preston and Bluestem lines gave reasonably good results. Marquis and Canada-Red lines were rather disappointing. Durum lines and certain unnamed ones were poorest.—*L. R. Waldron.*

HORTICULTURE

J. H. GOURLEY, *Editor*

H. E. KNOWLTON, *Assistant Editor*

(See also in this issue Entries 14, 213, 523, 526, 543, 577, 593, 601, 621, 659, 706, 707)

FRUITS AND GENERAL HORTICULTURE

356. ALLEN, W. J. An experiment with table grapes on sultana stock. *Agric. Gaz. New South Wales* 31: 600. 1920.—Judging by the yield, grafting trials showed that Corrichon and Ohanez vines do better by 50 per cent on their own stock than when grafted on sultana stock.—*L. R. Waldron.*

357. ALLEN, W. J., S. A. HOGG, AND W. LE GAY BRERETON. Orchard notes. *Agric. Gaz. New South Wales* 31: 599–600, 677–678, 748–750, 830–831, 898–900. 1920.—Practical suggestions of a timely nature are given upon care of orchards and products therefrom.—*L. R. Waldron.*

358. ANONYMOUS. Delmas pecan. *Amer. Nut Jour.* 12: 44. 1920.—The original Delmas pecan tree was grown from a nut planted by A. G. Delmas at Scranton, Mississippi, about 1877. The nut is large to very large in size, oblong ovate, has 4 conspicuous ridges, and is of good cracking quality. It has plump, straw colored kernels of rather soft texture and good quality.—*E. L. Overholser.*

359. ANONYMOUS. Fertilizing effects of sulphur on vines. *Cyprus Agric. Jour.* 15: 190–191. 1920.—This article is a summary of results secured by M. JEAN CHANZET, a French investigator, from an experiment undertaken to ascertain the action of sulphur upon the cultivation and yield of vines grown in the open. Two series of experiments were conducted, the 1st of which was designed to study the effect of sulphur without manure and the 2nd its effect with manure. The former gave an increase of over 25 per cent and the latter an increase of 27 per cent.—*W. Stuart.*

360. ANONYMOUS. Increasing leaf growth by perforating the root. *Sci. Amer. Monthly* 2: 14. 1920.—Experiments by MARIO CALVINO in Cuba are concerned, in which horizontal perforations of the primary root of cabbage, lettuce, parsley, etc., resulted in more luxurious development of the heads; and injections of nutritive solutions into the trunks of sterile pear trees caused them to bear again.—*Chas. H. Otis.*

361. ANONYMOUS. Largest and best equipped walnut packing house. Amer. Nut Jour. 13: 73. 1920.—The La Puente Valley Walnut Growers Association has established at La Puente, California, a walnut packing house three times as large as any other, and it has all modern facilities for grading, cleaning, and packing.—*E. L. Overholser.*

362. ANONYMOUS. Metodos de transplantar coqueiros. [Methods of transplanting coconuts.] Bol. Agric. Nova Goa [Portuguese East India] 1: 95-97. 1919. Popular.—*J. A. Stevenson.*

363. ANONYMOUS. One hundred million native pecan trees. Amer. Nut Jour. 12: 55. 1920.—BURBANK's statement is quoted in which the possibilities of pecan culture in the south, especially in Texas, are emphasized. Pecan trees make a prolific growth in western Texas and come into bearing the 1st or 2nd year after transplanting.—*E. L. Overholser.*

364. ANONYMOUS. The pruning and care of young apple trees. Better Fruit 15: 3-4. 1920.—Specific detailed directions are given for pruning from the time of planting to the bearing age. The protection of young trees from windstorms, snow, and ice is discussed.—*A. E. Murnceek.*

365. ANONYMOUS. Spanish chestnuts. Cyprus Agric. Jour. 14, 15: 146-148. 1919, 1920.—The Agricultural Department of Cyprus since 1900 has distributed several thousand Spanish chestnuts free of charge to villagers in the hills. It has been found that most of the trees begin fruiting in the 4th year. A large well-grown tree is claimed to yield in a season fruit worth as much as £5.—*W. Stuart.*

366. ANONYMOUS. Wolford pecan. Amer. Nut Jour. 12: 44. 1920.—Propagation of this variety in localities other than McKinney, Texas, where it originated is recommended. The yield, very good quality, and excellent cracking quality compensate to a considerable extent for the medium, or slightly below medium, sized nuts and the fact that the tree is a rather slender grower.—*E. L. Overholser.*

367. ANONYMOUS. [Rev. of: FLETCHER, S. W. Strawberry growing. Rural Science Series. xxi + 325 p. New York: The Macmillan Company: New York, 1917.] Sci. Prog. [London] 14: 510. 1920.

368. BARKER, B. T. P. A survey of west of England farm orchards. Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 110-121. 1919.—Results are given of a study of orchard conditions in the Counties of Devon, Gloucester, Somerset, Wiltshire, and Worcester.—*W. H. Chandler.*

369. BARKER, B. T. P., AND A. H. LEES. Factors governing fruit-bud formation. II. The normal annual growth of the apple and pear. Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 85-92. 1919.—Results are given of observations and experimentation concerning the growth of the different buds on a twig. On a Vicar of Wakefield pear, buds had pushed out enough to be measured by March 14. Up to April 12 there was little difference in the amount of growth from the different buds, but after that time the terminal buds gained precedence. The author's results suggest that this difference among the buds is partially explained, but not entirely so, by the work of LOEB, according to which growth of the apical bud depresses the growth of buds back of it, either by the use of the available nutrients or by the formation of a substance that, moving backward, inhibits growth at the other buds. By examining the buds in winter and the same ones again when growth had started it was found that weak dormant buds produce weak growth in spring. The authors think that the growth of a bud is influenced by (a) temperature, (b) inhibition effect suggested by Loeb, (c) bud strength, (d) root action, (e) variety influence.—*W. H. Chandler.*

370. BARKER, B. T. P., AND A. H. LEES. Factors governing fruit-bud formation. III. The effect of notching and ringing on apple trees. Ann. Rept. Agric. and Hort. Res. Sta.

Univ. Bristol 1919: 93-98. 1919.—A general discussion is presented of the practises of ringing and notching with a preliminary report on some experiments. Rings of varying widths were made on main trunks and branches, and knife-edge rings on twigs. Ringing, if portions of bark were actually removed, caused the dormant buds below the ring to grow. More buds pushed out as a result of May ringing than as a result of July ringing. Knife-edge ringing on the twigs caused buds to grow into spurs or shoots on which the basal bud made the most growth. Notching above a bud caused the latter to make more growth than that made by similar buds not so notched. Notching below a bud keeps the latter dormant.—*W. H. Chandler.*

371. BARKER, B. T. P., AND G. T. SPINKS. **Fruit breeding investigations.** Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 76-84. 1919.—A statement of breeding work in progress with apples, plums, cherries, currants, gooseberries, raspberries, and strawberries.—*W. H. Chandler.*

372. BATCHELOR, L. D., AND D. C. WYLIE. **Treating frosted trees.** Amer. Nut Jour. 13: 14. 1920.—Trees not badly frosted should be cut back to good healthy tissues, allowed to grow, and the new growth thinned out in the fall. The same principle should be applied in the case of badly frosted trees. A good vigorous shoot below the frosted area is selected, and the tree cut back to about 1 inch above this shoot. All other shoots on the trunk are removed. Wounds are immediately sealed with a thick mixture of linseed oil and white lead. This mixture is preferred to the black asphaltum wound dressings.—*E. L. Overholser.*

373. BIXBY, W. C. **Nut notes at Baldwin, New York.** Amer. Nut Jour. 13: 12. 1920.—Observations made on specimens at the Arnold Arboretum showed that in some respects the shellbark is more closely akin to the pecan than to the hickories in spite of the great resemblance, in leaves and fruit, to the shagbark and mockernut. In case of northern varieties now propagated, no definite information is available as to whether they bear an abundance of both staminate and pistillate flowers, and whether or not the latter mature at the same time. Consequently, several varieties should be planted to insure good crops.—*E. L. Overholser.*

374. BIXBY, W. G. **Propagated hickories.** Amer. Nut Jour. 13: 70-71. 1920.—Experiences of nut growers in breeding and propagating the hickory are reviewed. The author concludes: “. . . am convinced that as soon as we can furnish the fine hickories we have in commercial quantities, they will command prices equal to those paid for the finest pecans.”—*E. L. Overholser.*

375. BÖRNER. **Denkschrift zur Organization der Rebenzüchtung in Deutschland.** [Memorial paper on the organization of vine breeding in Germany.] Mitteil. Deutsch. Landw. Ges. 35: 689-692. 1920.—The author outlines the problems, the methods of procedure, and gives an estimate of the cost of maintaining a selection garden. The total cost of this type of work in Germany is also estimated.—*A. J. Pieters.*

376. BULLARD, W. P. **Pecan standards, brands and marketing.** Amer. Nut Jour. 13: 34, 47. 1920.—The “Brand method” is claimed to be best. The advantages of a cooperative organization such as the National Pecan Growers’ Exchange are detailed.—*E. L. Overholser.*

377. CHEVALIER, A. **Sur l’origine des pommiers à cidre cultivés en Normandie et en Bretagne.** [The origin of cider apples cultivated in Normandy and Brittany.] Compt. Rend. Acad. Sci. Paris 171: 521-523. 1920.—The 500 to 1000 varieties of cider apples in northwest France yield a crop which in a good year is valued at 500 million francs. The history of apple culture in Normandy and Brittany is given. It is held that the varieties have arisen from the four elementary species of *Malus communis*, namely, *M. acerba*, *M. dasycphylla*, *M. praecox*, and *M. prunifolia*, either directly or through crosses with the small fruited varieties of Asia, such as *M. baccata*.—*C. H. Farr.*

378. COVILLE, FREDERICK V. **The influence of cold in stimulating the growth of plants.** Jour. Agric. Res. 22: 151-160. Pl. 20-35. 1920.—Such woody plants as the blueberry taken into a warm greenhouse in autumn refused to grow, although plants left out in the cold through the winter grew at once on being taken into such a greenhouse. A single freezing would not cause them to grow, but a prolonged chilling, even above the freezing point, would do so. When only a portion of the plant was chilled, that portion only started into growth on being brought into a warm room. The author thinks that "during the process of chilling the starch grains stored in the cells of the plant are at first separated by the living and active cell membranes from the enzyme that would transform the starch into sugar, but when the plant is chilled the vital activity of the cell membrane is weakened so that the enzyme 'leaks' through it, comes in contact with the starch, and turns it into sugar." He thinks that when the plant finally starts to grow without having been chilled the same principle applies, the membrane separating starch from the enzyme being weakened. The same principle is believed to apply when seeds are benefited by stratification.—*W. H. Chandler.*

379. DEMAREE, J. B. **Some precautions in top-working pecan trees.** Amer. Nut Jour. 13: 74. 1920.—Several reasons are given for preferring coal tar for sealing up wounds. An admixture of creosote is recommended because of its greater penetrating and antiseptic properties. Applications should be repeated after two or three months, and as frequently thereafter as may seem necessary.—*E. L. Overholser.*

380. DEMING, W. C. **Plant black walnut.** Amer. Nut Jour. 13: 10. 1920.—The author takes exception to BLEY's statement and advocates the planting of black walnut along roadsides.—*E. L. Overholser.*

381. EDWARDS, C. L. **Selling standard pecans.** Amer. Nut Jour. 12: 27. 1920.

382. EDWARDS, C. L. **Transforming native to cultivated pecans in Texas.** Amer. Nut Jour. 12: 9, 13. 1920.

383. FORKETT, C. **Pecan breeding.** Amer. Nut Jour. 12: 69. 1920.—A report on crossing Columbian, Success, Russel, Schley and Pabst varieties. Since most of the trees have not come into bearing no definite results are given.—*E. L. Overholser.*

384. GIMINGHAM, C. T., AND O. GROVE. **Trial cider orchards.** Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 99-109. 1919.—A description of conditions and treatments in some trial orchards in Devon, Gloucester, Monmouth, and Somerset Counties.—*W. H. Chandler.*

385. HOOVER, M. H. **The farms by the side of the road.** Amer. Nut Jour. 13: 38-39, 46. 1920.—Economic and conservation considerations emphasize the unrealized national asset of nut trees planted along roadsides.—*E. L. Overholser.*

386. HOWARD, H. L. **More about root stocks.** Monthly Bull. Dept. Agric. California 9: 93-95. 1920.—The French prune makes very poor union with the apricot root. Japanese pear stock is more resistant to pear blight than the French stock and successfully resists attack of woolly aphis. Some of the Siberian seedlings give great promise as regards blight resistance. By bench-grafting long scions of Surprise pear on Japanese roots the trunks and bases of main branches are obtained blight resistant.—*E. L. Overholser.*

387. ISBELL, C. L. **Pecans on Piedmont soil in Alabama [U. S. A.].** Amer. Nut Jour. 13: 69. 1920.

388. JONES, J. F. **Pecans, other than those of the well-known sections.** Amer. Nut Jour. 12: 25, 30. 1920.—In its natural range the pecan is found farther north along the Mississippi in Iowa and Illinois than elsewhere in the U. S. A. Best varieties, like Marquardt and Witte,

were selected for northern propagation. Iowa has a climate which is colder than that of the same latitude farther east, and pecan trees there are hardier and have to mature fruit in a shorter season. These considerations are important in selecting varieties for northern planting.—*E. L. Overholser.*

389. LEWIS, C. I. Sites and soils for small fruits in the Northwest. *Better Fruit* 15⁵: 6, 17-18. 1920.—Adaptation of the various sections and localities of the Northwest to the commercial cultivation of the different varieties of small fruits is considered in detail. A rather heavy soil and fairly humid climatic conditions are of particular importance to the successful growing of almost all small fruits, the strawberry being a marked exception in this respect.—*A. E. Murneek.*

390. LITTLEPAGE, T. P. Black walnut for roadsides. *Amer. Nut Jour.* 13: 10. 1920.

391. LUCKS, R. Ueber die Zusammensetzung, insbesondere über den Stärkegehalt, einiger Reisigarten. [Concerning the composition, in particular the starch content, of certain kinds of prunings.] *Landw. Jahrb.* 35: 585-615. 1919.—The author calls attention to the possible value as fodder of the prunings from vines, fruit trees, and from certain shade trees. Twigs collected in December were studied with reference to general chemical composition, and microscopically to determine relative starch content and lignification of walls. The following species were used: *Acer platanoides*, *A. pseudoplatanus*, *A. negundo*, *Aesculus hippocastanum*, *Betula verrucosa*, *Populus virginiana*, *Pirus communis*, *P. malus*, *Tilia platyphyllos*, *Ulmus campestris*, and *Vitis vinifera*. The estimated starch content was least in *Betula verrucosa* and greatest in *Vitis vinifera*. The relative lignification of the cell walls was least in *Tilia platyphyllos* and greatest in *Ulmus*. The paper is accompanied by several plates showing photomicrographs of cross sections and starch grains in various species.—*A. J. Pieters.*

392. OWEN, T. F. Budded tree campaign in Texas. *Amer. Nut Jour.* 13: 7. 1920.

393. PATTERSON, J. H. Cost and development of pecan unit orchards. *Amer. Nut Jour.* 13: 36. 1920.—The ideal development of a pecan orchard requires rich soil enriched each year by ploughing under legumes. Under these conditions the orchard will yield a paying crop in 10 years.—*E. L. Overholser.*

394. PEARCY, K. Timely notes on Oregon nut growing. *Better Fruit* 15⁴: 12, 24. 1920.—A general discussion is presented on filbert growing in Oregon. Varietal differences are emphasized. Some of the main commercial varieties appear to be self-sterile. Investigations conducted at present by the Oregon Agric. Exp. Sta. may throw some light on the pollination problem in the filbert.—*A. E. Murneek.*

395. RAMSEY, F. T. Some of the older varieties of pecans of Texas origin. *Amer. Nut Jour.* 13: 67-68. 1920.—Reviews are presented of the important varieties, giving dominant characteristics. Instances are cited to show that varieties from the arid western regions when grown farther east under more humid atmospheric conditions decline, both as to health of the trees and size and plumpness of the nuts.—*E. L. Overholser.*

396. RASMUSSEN, P. M. Pecans in California. *Amer. Nut Jour.* 12: 30. 1920.—The best nuts of Fresno County are grown at Selma, which is also a promising district for the walnut and almond.—*E. L. Overholser.*

397. READ, F. W. The new shipping-point inspection service on fruits and vegetables. *Monthly Bull. Dept. Agric. California* 9: 371-374. 1920.—The inspection work is being undertaken by the Standardization Service at terminal marketing points. A certificate of inspection is issued which includes details of car storage and condition and quality of pack and fruit. The certificate is receivable as prima-facie evidence in the courts of the State.—*E. L. Overholser.*

398. REED, C. A. Pecan varieties, grades, standard and packages. Amer. Nut Jour. 12: 82, 93. 1920.
399. REED, C. A. The status of the American nut industry. Amer. Nut Jour. 12: 41. 1920.
400. RISIEN, E. E. Sovereign pecan. Amer. Nut Jour. 12: 44. 1920.—The variety was first named "Texas prolific" and later received its present name because of its high quality. The nut is large, oblong, generally symmetrical, bright red to reddish brown in color, and has a plump kernel of fine quality.—*E. L. Overholser.*
401. SALISBURY, E. J. [Rev. of: DUKE OF BEDFORD, AND SPENCER PICKERING. Science and fruit growing. xxii + 351 p., 4 pl., 47 fig. MacMillan & Co., Ltd.: London, 1919.] Sci. Prog. [London] 14: 506-507. 1920.
402. SEVIER, H. Almond growers' problem. Amer. Nut Jour. 12: 30. 1920.—The problem is the development of varieties blooming late enough to escape frost. At present the only important variety which blooms late is the Drake, and even this one is not late enough to escape all frosts.—*E. L. Overholser.*
403. SIMONDS, O. C. Nut trees in landscape work. Amer. Forestry 26: 618-621. 7 fig. 1920.
404. STICKEY, H. P. Varieties of pecans for Georgia. Amer. Nut Jour. 12: 12. 1920.—The varieties Alley, Moneymaker, Moore, Pabst, Stuart, Schley, and Teche are recommended on the basis of results obtained at the Georgia Agric. Exp. Sta. since 1908. Trees should be planted preferably 50-60 feet apart.—*E. L. Overholser.*
405. TAYLOR, R. H. The nut industry in the U. S. from a practical standpoint. Amer. Nut Jour. 12: 37-38. 1920.—At present commercial culture of the almond is limited largely to California, which produces 99 per cent of the total crop. Commercial production of walnuts in the U. S. A. is at present largely confined to the Pacific coast, in fact largely to California, which at present produces 96 per cent of the domestic product. Pecans, however, are best produced in the southern states.—*E. L. Overholser.*
406. WELDON, G. P. An old peach under a new name,—Ontario. Monthly Bull. Dept. Agric. California 9: 357-362. 1920.—The name Ontario has been substituted for Southern Tuscan. It is quite distinct from the northern variety, Tuskena. The Ontario is round rather flat variety, its leaf serration is more marked, a more regular bearer, has a smaller and more roundish pit with shallow convolutions, and is of much better quality than the Tuskena.—*E. L. Overholser.*
407. WHITTEN, J. C. Frost control and related factors. Monthly Bull. Dept. Agric. California 8: 675-678. 1919.
408. WHITTEN, J. C. Transplanting deciduous fruit trees. Monthly Bull. Dept. Agric. California 9: 73-75. 1920.
409. WITTE, O. F. Nut culture in Ohio. Amer. Nut Jour. 12: 7. 1920.
410. WYLIE, D. C. Heavy walnut planting. Amer. Nut Jour. 12: 77. 1920.—Shortage of nursery stock is attributed to abnormal conditions created during the war, and to the attempt of the producer to meet a large increased demand. The northern black walnut (*Juglans hindsii*) is considered the best stock for grafting. The author outlines the geographical distribution of the new walnut plantations.—*E. L. Overholser.*
411. YOUNG, F. D. Smoke and direct radiation in fruit protection. Better Fruit 15⁶: 5-6. 1920.—Reprint from California Citrograph 6: 6, 40. 1920.—*A. E. Murneek.*

FLORICULTURE AND ORNAMENTAL HORTICULTURE

412. ANONYMOUS. How spring flowers can bloom unharmed in spite of frosts. Sci. Amer. Monthly 2: 27. 1920.

413. ANONYMOUS. Rose cultivation and extraction of rose oil in Cyprus. Cyprus Agric. Jour. 15: 195-196. 1920.—At Milikouri, which is the principal rose growing village, the number of rose plants has doubled in the last 3 years and the industry is extending at Pedoulas, Kykko, and Chakistra. 3000 plants were grown by the students of the School Garden at Agros. Templos, Kyrenia, and Limassol are mentioned as newly developing centers.—W. Stuart.

414. WARD, E. N. The cultivation of flowers for profit. Agric. Gaz. New South Wales 31: 894. 1920.—General suggestions are given.—L. R. Waldron.

VEGETABLE CULTURE

415. ANONYMOUS. How to grow your own seed. Cyprus Agric. Jour. 15: 178-180. 1920.—Owing to the fact that there are no reliable seed growers in Cyprus and that imported seeds are not satisfactory due to not being acclimated, farmers and gardeners are advised to raise their own seed of such crops as beans, Indian corn, lettuces, melons, peas, cucumbers, spinach, and tomato. Recommendations are given for producing high grade seed.—W. Stuart.

416. ANONYMOUS. [Rev. of: BOYLE, J. G. Vegetable growing. ix + 334 p., 154 fig. Lea and Febiger: Philadelphia and New York, 1917.] Sci. Prog. [London] 14: 509-510. 1920.

417. COCKERELL, T. D. A. The Girasole or Jerusalem artichoke. Monthly Bull. State Commission Hort. California 8: 243-250. 1919.—The Girasole, *Helianthus tuberosus*, is a native of America, is tall, erect, and has an abundance of foliage and underground tubers. The latter mature in the fall, remain in the soil during winter unaffected by frost, and are good for domestic use and as animal feed. The tubers do not contain starch but instead inulin, which for assimilation requires hydrolysis. Artificial hydrolysis may prove practicable and desirable.—E. L. Overholser.

418. PEDERSEN, A. Almindelig dansk Gartnerforenings Planteavls-Udvalgs Beretning for 1919. [Danish Garden Union, report of experiments, 1919.] Gartner-Tidende [København] 36: 77-86. 1920.—Experiments are reported with cultivation of carrots and leeks, as well as investigations on varieties of tomatoes, peas, and beans best fitted for the country.—Ernst Gram.

419. REED, C. A. The American nut industry as a whole. Amer. Nut Jour. 12: 70-71. 1920.—In the U. S. A. there are five nut organizations, all striving to stimulate nut production and consumption. The author outlines the geographical distribution in the U. S. A. of walnuts, pecans, and almonds, and points out some important considerations in the production of nuts.—E. L. Overholser.

420. SCHLEINITZ, MARIE FREÜN VON. Über die Zusammensetzung von Gemüse Abfall. [Composition of vegetable waste.] Landw. Jahrb. 35: 781-807. 1919.—The author reports extensive studies on the proportions and chemical composition of edible matter and waste in various vegetables.—A. J. Pieters.

421. TEMPLE, C. E. Spacing tomato plants for field spraying. [Abstract.] Phytopath. 10: 59. 1920.

HORTICULTURE—PRODUCTS

422. ANONYMOUS. **Charcoal from nut shells.** Amer. Nut Jour. 12: 7. 1920.—The California Walnut Growers' Association has decided to proceed with the installation of equipment for making charcoal out of walnut shells from the cracking plants. Of all by-products suggested the charcoal seemed the most practicable to manufacture.—*E. L. Overholser.*

423. CHRISTIE, A. W. **The University farm evaporator.** Monthly Bull. Dept. Agric. California 9: 125-130. 1920.—A detailed description of the evaporator is followed by a report on investigations concerning temperature, humidity, and economy. The evaporator provides better sanitation and imparts a better quality to the product than when sun dried. It also reduces the risk from adverse weather conditions. Careful handling of the product is necessary where the temperature is allowed to go beyond 170° F. as chemical decomposition may result, especially if recirculation of the air is not provided for.—*E. L. Overholser.*

424. CRUESS, W. V. **Discussion of fruit evaporation.** Monthly Bull. Dept. Agric. California 8: 685-688. 1919.—Properly evaporated fruits are superior to the average sun-dried article in point of quality and sanitation. They also require less sulfuring and hence have a lower sulfurous acid content. Evaporation by the circulation of artificially heated air is an economy.—*E. L. Overholser.*

425. CRUESS, W. V. **Types of evaporators.** Monthly Bull. Dept. Agric. California 9: 104-113. 1920.—General principle involved in evaporation of fruit and vegetables is the utilization of the high water-absorbing capacity of hot, dry air. A rise in temperature of 27° F. doubles the water-absorbing capacity of the air. Recirculation of the spent air, besides being an economy, maintains the relative humidity within a desirable range. Fruit enters the evaporator at a moderate temperature, and as it dries higher temperatures can be used, thus lessening the danger of decomposing the fruit sugars. Evaporators are placed in three classes: (1) Natural draft evaporators; (2) forced draft evaporators; and (3) distillation types, including vacuum evaporators. In a vacuum drier the large reduction of oxygen and the lower temperature give a product unexcelled by other types of evaporators.—*E. L. Overholser.*

426. GROVE, OTTO. **Cider making experiments for the season, 1918-19.** Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 14-17. 1919.—This paper reports the results of experiments in making fermented cider from mixed apples and from single varieties, and in making perry. Analyses are given of the fresh cider and of the cider after a given amount of sugar had been added. The whole had been diluted with the second pressing from the pomace, to which water had been added. Specific gravity after fermentation and alcoholic content after one year in the bottle are given.—*W. H. Chandler.*

427. GROVE, OTTO. **The relation between the rate of fermentation and the content of nitrogenous matter in apple juice.** Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 20-22. 1919.—Samples of cider from 6 varieties were fermented and analyzed for nitrogen. Those containing 0.0221, 0.0135, 0.0146, and 0.0168 per cent of nitrogen fermented regularly until only a trace of sugar was left. That with 0.0033 per cent nitrogen fermented very slightly and 6.3 per cent of sugar was left. That containing 0.0094 per cent nitrogen fermented slowly and 1.04 per cent of sugar was left.—*W. H. Chandler.*

428. GROVE, OTTO. **Some experiments on ropiness in cider.** Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 18-19. 1919.—A bacillus capable of causing ropiness in cider had previously been isolated. Eight samples of cider were inoculated with this bacillus during the summer of 1917. By early summer, 1918, 5 of these samples had developed ropiness while no uninoculated samples had done so.—*W. H. Chandler.*

429. JAFFA, M. E. **Standards for water content of dried fruits.** Monthly Bull. Dept. Agric. California 9: 117. 1920.—The old limit of 27 per cent of water was higher than neces-

sary; 24 per cent should be the maximum allowed for any dried fruit. Interstate trade demands uniformity of laws regarding maximum water content of fruit products.—*E. L. Overholser.*

430. NICHOLS, P. F. A brief summary of activities of the U. S. Department of Agriculture in dehydration. Monthly Bull. Dept. Agric. California 9: 133-136. 1920.—The basic principle of dehydration is the reduction of moisture to a point where bacteria, yeasts, and molds, the chief agents of spoilage, are unable to grow. Starchy and sugary vegetables and fruits generally do not show spoilage until a moisture content of 25-30 per cent is reached. The optimum temperature for the spoilage organisms is 70-98° F.; some grow below 70 and few above 100° F. The Indian meal moth (*Plodia interpunctella*) is most common and destructive insect pest found in the dried products.—*E. L. Overholser.*

431. TUFTS, W. P. The Oregon tunnel evaporator. Monthly Bull. Dept. Agric. California 9: 131-133. 1920.—The temperature is allowed to rise gradually from 90 or 100 to 120 or 140° F., and the finishing temperatures vary from 160 to 185° F., the process generally requiring 24-36 hours. A strong objection to this type of drier is that the fruit can be examined only in the last stages of evaporation. However, it has been found that the circulation of air is such that fruit dries almost perfectly in proportion to the distance from the fire.—*E. L. Overholser.*

MORPHOLOGY, ANATOMY AND HISTOLOGY OF VASCULAR PLANTS

E. W. SINNOTT, *Editor*

(See also in this issue Entries 97, 391, 512, 573, 657, 688)

432. ANONYMOUS. [Rev. of BEAUVISAGE, L. Contribution à l'étude de la famille des Ternstroemiaceés. (Contribution to the anatomical study of the Ternstroemiaceae.) Thesis Doct. de Science, Poitier. 470 p., 229 fig. 1920.] Bull. Sci. Pharm. 27: 598-599. 1920.—The author examined more than 50 genera and found that 30 of these, generally accredited to the Ternstroemiaceae, do not actually belong to it. He believes that only *Ternstroemia*, *Adiandra*, *Schima*, *Haemocharis*, *Camellia*, *Thea*, and *Stewartia* belong to this family, and bases his opinion on an anatomical and morphological study of the plants. The general characteristics of these genera are: The flowers have 5 petals and 5 sepals, overlapping each other; numerous stamens, their meristems united with the corolla; a well developed cuticle; numerous calcium oxalate crystals; sclereids in the cortical parenchyma of the stem, in the pith, in the limb, in the sepals, in the petals, and in the pericarp. They differ from the Hypericaceae, Guttiferae, and Dipterocarpaceae in the absence of secretion channels.—*H. Engelhardt.*

433. ANONYMOUS. [Rev. of: CHAMBERLAIN, C. J. The living cycads. xiv + 172 p., 91 fig. University of Chicago Press: Chicago.] Sci. Prog. [London] 14: 507-508. 1920.

434. C., A. H. [Rev. of: ARBER, AGNES. Water plants, a study of aquatic angiosperms. 436 p., 172 fig. Cambridge Univ. Press: Cambridge, England, 1920.] Jour. Botany 58: 296-298. 1920.

435. CHIFFLOT, F. Sur les canaux sécréteurs gommifères des racines de Cycadacées, et plus particulièrement ceux du *Stangeria paradoxa* T. Moore. [On the latex ducts of the roots of cycads, and especially those of *Stangeria paradoxa*.] Compt. Rend. Acad. Sci. Paris 171: 257-258. 1920.—Twelve species of cycads representing 8 genera were studied and in only 1 case were laticiferous tubules found in all parts of the root. In this instance they did not occur in the very young rootlets and in the coralloid roots. The canals, whether they anastomose or not, are endocelic. They are usually formed schizogenously, but in old roots may have a schizo-lysigenous origin.—*C. H. Farr.*

436. FRANGOS, G. **Self-grafting by approach.** *Cyprus Agric. Jour.* 14, 15: 145-146. 1919, 1920.—The union of 2 plants of *Phaseolus multiflorus* was observed by the author to have occurred some 2 feet above the ground, from which point they became joined together in 1 stem. One of the stems was cut off 3 inches below the point of union and it was found that the upper portion of the plant was able to draw its nourishment from the one on which it was self-grafted. The most interesting feature, however, was the putting forth of aerial roots at the point where the stem was cut off.—*W. Stuart.*

437. GRIER, N. M. **Light correlated variations of the sterile stem of *Equisetum sylvaticum*.** *Rhodora* 22: 165-167. 1920.—In a study of this species from a colony growing at Bellevue, Pennsylvania, the author makes comparisons between plants growing constantly well shaded and those receiving sunlight throughout the day. Correlation tabulations from 100 individuals of each habitat indicated that those growing in the sun had on the average a larger number of whorls to the stem, and more leaves to the particular whorl chosen for counting, and also that their stems were longer, or at least they had their whorls of leaves growing higher on the stem, than those from shady habitat.—*James P. Poole.*

438. HEUSSER, C. **Over de voortplantingsorganen van *Hevea brasiliensis* Müll Arg.** [The reproductive organs of *Hevea brasiliensis* Müll Arg.] Mededeel. Alg. Proefsta. A. V. R. O. S. [Medan, Sumatra] Rubberserie 24. 1919.—Reprint from Arch. Rubbercult. 3: 455-515. 1919.

439. LECOMTE, HENRI. **Les canaux sécréteurs radiaux du bois.** [The radial secretory canals in wood.] *Compt. Rend. Acad. Sci. Paris* 171: 533-536. 1920.—Radial secretory canals are present in *Pinus*, *Picea*, and *Larix*, but absent in 11 other genera of conifers. Six genera of the Anacardiaceae are found with them and 2 without. Their occurrence in the Burseraceae is problematical. In *Spondias* the radial canals are found to connect with the longitudinal canals of the secondary wood but not with those of the pith.—*C. H. Farr.*

440. MAAS, J. G. J. A. **De bloembioogie van *Hevea brasiliensis*.** [The floral biology of *Hevea brasiliensis*.] Mededeel. Alg. Proefsta. A. V. R. O. S. [Medan, Sumatra] Rubberserie 22. 1919.—Reprint from Arch. Rubbercult. 3: 288-312. 1919.

441. RESVOLL, THEKLA R. **En utpaaget selvbestøver.** [A distinctly self-pollinated plant.] *Nyt Mag. Naturvidenskab.* 56: 131-135. 4 fig. 1919.—Description of mode of self-pollination of *Epilobium anagallidifolium* Lam. by pressure of stamens against stigma.—*A. Gundersen.*

442. SALISBURY, E. J. **Botany.** *Sci. Prog.* [London] 14: 389-392, 572-575. 1920.—A brief review of some of the more important recent papers on anatomy, cytology, morphology, taxonomy, ecology and economic botany.—*J. L. Weimer.*

443. SOUEGÉS, RENÉ. **Embryogénie des Composées. Les premiers stades du développement de l'embryon chez le *Senecio vulgaris* L.** [The embryogeny of the Compositae. The first stages in the development of the embryo of *Senecio vulgaris*.] *Compt. Rend. Acad. Sci. Paris* 171: 254-256, 356-357. 13 fig. 1920.—The embryo of *Senecio* in its early stages of development resembles that of *Helianthus*. It is similar to other Compositae in the non-formation of octants and in the formation of the hypocotyl from the basal cell of the two celled embryo.—*C. H. Farr.*

444. WISSELINGH, C. VAN. **Bijdragen tot de Kennis van de Zaadhuid. Zesde bijdrage: Over de Zaadhuid der Onagraceen en Lythraceen.** [Contribution to a knowledge of the seed-coat. Sixth contribution: The seed-coat of the Onagraceae and Lythraceae.] *Pharm. Weekblad* 57: 77-83, 125-139. Pl. 1, 10 fig. 1920.—In the Onagraceae and Lythraceae the 2 integuments and the innermost integument and the nucellus at first are separated. In the Onagraceae, with the exception of *Epilobium angustifolium*, the cuticle generally disappears

during the development of the seed. In the Lythraceae, however, it remains. The cuticle between the 2 integuments and that between the seed-coat and the nucellus remain intact in both species. In the chalaza cork tissue is developed, which connects with the inner cuticle between the seed-coat and the nucellus. At times layers of the seed-coat develop into cork cells.—*H. Engelhardt*.

445. WISSELINGH, C. VAN. Bijdragen tot de Kennis van de Zaadheid. Zevende bijdrage: Over de Zaadheid van *Tropaeolum majus* L. (*Tropaeolaceen*), *Hypericum quadrangulum* L. (*Hypericaceen*) en *Ipomoea purpurea* Roth (*Convolvulaceen*). [Contributions to a knowledge of the seed coat. Seventh contribution: The seed coat of *Tropaeolum majus* L. (*Tropaeolaceae*), *Hypericum quadrangulum* L. (*Hypericaceae*) and *Ipomoea purpurea* Roth (*Convolvulaceae*).] Pharm. Weekblad 57: 575-583, 605-614. Pl. 2, 12 fig. 1920.—A survey of our knowledge, and particularly of the work of KAYSER, as to the morphological character of the seed coats in these 3 species. The presence in the young integument of cuticles which later disappear during the development of the ovule into the seed; and the history of the chalazal tissue, are especially studied. The author concludes that the chalaza should be regarded as a part of the seed coat.—*H. Engelhardt*.

MORPHOLOGY AND TAXONOMY OF ALGAE

E. N. TRANSEAU, *Editor*

(See in this issue Entries 99, 103, 687)

MORPHOLOGY AND TAXONOMY OF BRYOPHYTES

ALEXANDER W. EVANS, *Editor*

(See also in this issue Entries 118, 123, 130, 133, 134, 142, 687)

446. CAMPBELL, D. H. Studies in some East Indian Hepaticae. *Calobryum* Blumei, N. ab E. Ann. Botany 34: 1-12. Pl. 1, 6 fig. 1920.—*Calobryum* differs in several important particulars from the Jungermanniales, with which it is usually associated. The early stages of the antheridium and archegonium are very similar, supporting GOEBEL's theory of the close homologies of these organs. There is, however, considerable variation shown, especially by the antheridium. The genus is acrogynous, i.e., the apical cell finally becomes transformed into an archegonium. This organ has only 4 rows of peripheral neck-cells, and a cap-cell may be wanting. The sporophyte differs from that of the typical Jungermanniales in having but 1 layer of wall cells, thus more nearly resembling the Sphaerocarpaceae or Marchantiales. The family Calobryaceae is well founded, and perhaps a distinct order Calobryales ought to be established.—*D. H. Campbell*.

447. FLEISCHER, MAX. Kritische Revision von Carl Müllerschen Laubmoosgattungen. [Critical revision of Carl Müller's genera of mosses.] Hedwigia 61: 402-408. 1920.—This paper (which is to be continued) forms a part of a series in which the specimens contained in the herbarium of C. MÜLLER (of Halle) are critically discussed. It consists mostly of names arranged in 2 parallel columns, the first giving Müller's determinations and the second those of the author. Determinations which required neither revision nor transference to other genera are mostly omitted. The following genera, as understood by Müller, are taken up: *Braunia*, *Harrisonia*, *Hedwigia*, *Cyrtopus*, *Bescherellia*, *Spiridens*, *Trachypus*, *Myrinia*, *Mollirete*, *Eriodon*, *Dimerodontium*, *Rozea*, *Habrodon*, *Fabronia*, *Helicodontium*, and *Schwetschkea*. Several of Müller's species are reduced to synonymy, and many new combinations are necessitated through the transference of species.—*A. W. Evans*.

448. FLEISCHER, MAX. Natürliches System der Laubmoose. [Natural classification of the mosses.] Hedwigia 61: 390-400. 1920.—The classification here proposed is based on

characters drawn partly from the sporophyte and partly from the gametophyte. In the larger divisions the sporophytic characters are emphasized; in the smaller divisions, the gametophytic. The class Musci is first divided into the 3 subclasses Sphagnales, Andreaeales, and Bryales. The first 2 of these each include a single family, but the third is further divided into the 3 groups (Reihengruppen) Eubryinales, Buxbaumiinales, and Polytrichinales. Of these groups the first embraces the following orders (Reihen): Fissidentales (1 family), Dicranales (8 families), Pottiales (4 families), Grimmiiales (1 family), Funariales (5 families), Schistostegiales (1 family), Tetraphidales (1 family), Eubryales (16 families), Isobryales (21 families), Hookeriales (6 families) and Hypnobryales (12 families). The second group embraces the orders Buxbaumiiales and Diphysciales (1 family each), and the third group the orders Dawsoniales and Polytrichales (1 family each).—A. W. Evans.

449. GARGEANNE, A. J. M. Über *Haplozia caespiticia* Dum. Recueil Trav. Bot. Néerland. 17: 205–217. 6 fig. 1920.—*Haplozia caespiticia*, a very rare species in the Netherlands, reaches its maximum development in late September and early October and is quickly overgrown by other bryophytes. It contains the largest oil-bodies heretofore observed in the Hepaticae. These are especially pronounced in the cells of the leaves, where they frequently take up the entire width of the cell. They occur also in the protonema but are minute or even lacking in the cells of the stem. *Haplozia caespiticia* is one of the very few Jungermanniales which produce endogenous gemmae. These are borne in hundreds at the apexes of the stem and also on the protonema; they are set free by the gelatinization of the cell walls. When germinated on peat under glass the gemmae give rise to orthotropous shoots with bilobed or even serrate leaves, instead of the roundish leaves normal to the species.—J. C. Th. Uphof.

450. LESAGE, P. Contributions à l'étude de la germination des spores de mousses. [Germination of moss spores.] Compt. Rend. Acad. Sci. Paris 166: 744–747. 1918.—See Bot. Absts. 7, Entry 433.

451. LORCH, WILHELM. Die Haube von *Polytrichum formosum* Hedw. [The calyptra of *Polytrichum formosum*.] Hedwigia 61: 346–347. 1920.—The author shows that the operculum of *Polytrichum formosum* remains closely attached to the calyptra and that both organs are thrown off simultaneously. He considers that the calyptra, thus acting as a sort of "flight organ," plays an important part in the separation of the operculum, in addition to carrying out its function of protecting the developing capsule.—A. W. Evans.

452. MACHADO, A. Notes de bryologie portugaise. [Notes on Portuguese mosses.] Bull. Soc. Portugaise Sci. Nat. 8: 43–45. 1918.—In the first part of the paper 4 mosses new to the flora of Portugal are recorded, 1 species being described as new under the name *Pottia Sampaiana*. It approaches *P. cavifolia*, var. *epilosa* Schp. and was discovered by G. SAMPÁIO in the province of Algarve. In the second part of the paper the opinion is advanced that *Hypnum lusitanicum* Schp. represents an aberrant form of *Rhynchostegium rusciforme* Br. & Schp.—A. W. Evans.

453. MALTA, N. Beiträge zur Moosflora des Gouvernements Pleskau mit besonderer Berücksichtigung des Kalksteingebietes der Welikajamündung. [Contributions to the moss flora of the Government Pskov, with special reference to the limestone region at the mouth of the Velikaia River.] 78 p., 12 fig. Riga, 1919.—This report on the bryophytes of the Government Pskov in western Russia is based on observations and collections made by the author during the years 1916 and 1917. The species occurring on limestone, on sandstone, and on clayey substrata are separately discussed, and the influences exerted on the bryophytic flora by the physical and chemical factors of the soil are clearly indicated. In the enumeration of species which concludes the work 35 hepatics, 15 peat mosses, and 206 mosses are listed with definite data regarding stations. The only new species proposed is *Bryum androgynum* Warnst., but a new var. *pleskowiensis* Malta is described under *Seligeria recurvata*. The new species and the new variety are illustrated.—A. W. Evans.

454. SØRENSEN, S. *Pterigynandrum filiforme* (Timm) Hedw. og dens vegetative formeringsformer. [Pterigynandrum filiforme and its forms of vegetative multiplication.] *Nyt Mag. Naturvidenskab.* 56: 137-148. 1 pl., 2 fig., 1 map. 1919.—The author describes propagation by gonidia and by vegetative branching in *Pterigynandrum filiforme*. His observations are based on field and herbarium studies and on experiments.—A. Gundersen.

455. WARNSTORF, C. Bemerkungen zu *Androcryphia confluens* (Tayl.) Nees in Synops. Hep. S. 471 (1844). [Remarks on *Androcryphia confluens*.] *Hedwigia* 61: 343-345. 1920.—The author's observations are based on material collected by HERZOG in the Andes of Bolivia and determined by STEPHANI as *Androcryphia confluens*. In some of the specimens he finds purplish red rhizoids, which are not supposed to occur in the genus. He comments on the systematic position of *Androcryphia* and calls attention to the fact that Stephani makes no mention of it in his published account of Herzog's Hepaticae.—A. W. Evans.

MORPHOLOGY AND TAXONOMY OF FUNGI, LICHENS, BACTERIA AND MYXOMYCETES

H. M. FITZPATRICK, *Editor*

(See also in this issue Entries 108, 128, 234, 519, 521, 661, 687)

FUNGI

456. ADAMS, J. F. *Darluka* on *Peridermium Peckii*. *Mycologia* 12: 309-314. Pl. 21. 1920.—*Darluka filum* (Biv.) Cast., parasitizing various rusts and various rust forms, including pycnia and aecia is described in detail.—H. R. Rosen.

457. ANONYMOUS. Index to American mycological literature. *Mycologia* 12: 343-346. 1920.

458. ANONYMOUS. [Rev. of: OLIVER, WADE W. Cultural studies in a case of sprue. *Jour. Amer. Med. Assoc.* 74: 27-28. 1920.] *Jour. Tropic. Med. and Hygiene* 23: 50. 1920.—From the stool, sputum, tongue, etc., was isolated a species of *Monilia* growing as a yeast. Intra-peritoneal injection into a guinea pig resulted fatally in 7 days. The fungus was reisolated from the liver and gall bladder.—E. A. Bessey.

459. BEER, RUDOLPH. On a new species of *Melanotaenium* with a general account of the genus. *Trans. British Mycol. Soc.* 6: 331-343. Pl. 8. 1920.—A species of *Melanotaenium* was found to be the cause of tumour-like swellings on the subterranean stems and leaf-structures of *Lamium album*. The fungus is described and named *M. Lamii*. A study of the cytology of the fungus shows that the hyphal cells are binucleate and the mature spores uninucleate.—W. B. McDougall.

460. BUCKLEY, W. D. A new *Discinella*. *Trans. British Mycol. Soc.* 6: 346-347. 1920.—*Discinella margarita* is described as new.—W. B. McDougall.

461. BURT, EDWARD ANGUS. The Thelephoraceae of North America. XII. *Stereum*. *Ann. Missouri Bot. Gard.* 7: 81-248. Pl. 2-6, fig. 1-48. 1920.—In this continuation of the monograph of the Thelephoraceae of North America, Burt presents a comprehensive taxonomic account of the genus *Stereum*. The treatment of this large genus of 77 accepted species includes an elaborate key to the species and under each of the American species discussed there are given the synonymy and references to literature, full diagnoses, notes on occurrence, habits, peculiarities, and citations of specimens examined. The species are arranged in sections as central-stemmed, lateral-stemmed, merismatoid, and dimidiate and effuso-reflexed species. Burt finds the difficulties of identification, experienced by many workers, greatly decreased after a thorough study and analysis of the microscopically recognizable organs or combinations of organs. Among the North American species referred to, 12 are new and 5 are newly combined. The new species

are *Stereum caespitosum*, *S. saxitas*, *S. pubescens*, *S. conicum*, *S. patelliforme*, *S. Earlei*, *S. magnisporum*, *S. spumeum*, *S. erumpens*, *S. sepium*, *S. heterosporum*, and *S. durum*. Among the new combinations *S. exiguum*, *S. radicans*, *S. craspedium*, and *S. Murrayi* were transferred from the genus *Thelephora*, and *Stereum rugisporum* from *Hymenochaete*. In addition, notes are recorded on 10 imperfectly known species and 20 excluded from the genus. Among the latter *Stereum subcruentatum* Berk. & Curtis becomes "*Aleurodiscus subcruentatus* (B. & C.) Burt, n. comb.; now included among American species, because of collections received from California and Oregon."—*S. M. Zeller*.

462. CHARDON, CARLOS E. A list of the Pyrenomycetes of Porto Rico collected by H. H. Whetzel and E. W. Olive. *Mycologia* 12: 316-321. 1920.—Sixty-five species are listed, the genera *Meliola* and *Phyllachora* being best represented.—*H. R. Rosen*.

463. ELLIOTT, JESSIE S. BAYLISS, AND HELENA C. CHANCE. The conidia and paraphyses of *Pezicula eucrita* Karst. *Trans. British Mycol. Soc.* 6: 353-354. 1 fig. 1920.—The ascospores of this fungus are not readily discharged from the asci but they germinate, often within the asci, and produce conidia very abundantly.—*W. B. McDougall*.

464. JOHNSON, MARIE E. M. On the biology of *Panus stypticus*. *Trans. British Mycol. Soc.* 6: 348-352. Pl. 9. 1920.—The sporophores of this fungus are not able to grow in the smoky atmosphere in the vicinity of iron and chemical works nor in the absence of light. They are not affected by frost and are very xerophytic. The mycelium likewise can be dried for many months and still retain its vitality.—*W. B. McDougall*.

465. JONES, FRED RUEL, AND CHARLES DRECHSLER. The development of *Urophlyctis alfalfae*. [Abstract.] *Phytopath.* 10: 65. 1920.

466. MURRILL, WILLIAM A. Light-colored resupinate polypores—II. *Mycologia* 12: 299-308. 1920.—Descriptive notes of 20 species of *Poria* are given. The following are the new species described: *P. linearis*, *P. hondurensis*, *P. Johnstonii*, *P. salicina*, *P. perextensa*, *P. hymeniacola*, *P. separans*, *P. roseitingens*, *P. Cokeri*, *P. distorta*, *P. submollusca*, *P. lignicola*, *P. montana*, and *P. arachnoidea*.—*H. R. Rosen*.

467. MURRILL, W. A. The fungi of Blacksburg, Virginia. *Mycologia* 12: 322-328. 1920.—More than 150 species of fungi are listed, most of them being fleshy forms. *Pluteus prae-rugosus* is described as a new species.—*H. R. Rosen*.

468. PAUL, DAVID. Note on *Marasmius Caulicinalis* (With.) Fr. *Trans. British Mycol. Soc.* 6: 344-345. 1920.—After discussing the orthography and history of the specific name the author concludes that the original spelling, *caulicinalis*, should be restored.—*W. B. McDougall*.

469. REA, CARLETON. New or rare British fungi. *Trans. British Mycol. Soc.* 6: 322-330. Pl. 7. 1920.—The following species and one variety are described as new: *Mycena atrovirens*, *Marasmius obtusifolius*, *Pluteus phlebophorus* (Dittm.) Fr. var. *albofarinosa*, *Nolanea strigosissima*, *Astrosporina fulva*, and *Urceolella Iridis*.—*W. B. McDougall*.

470. SMITH, A. LORRAIN, AND J. RAMSBOTTOM. New or rare microfungi. *Trans. British Mycol. Soc.* 6: 365-374. 1920.—*Lophodermium lineatum* is described as new.—*W. B. McDougall*.

471. TANAKA, TŌZABURŌ. New Japanese fungi—Notes and translations—IX. *Mycologia* 12: 329-333. 1920.—The following fungi are described: *Helminthosporium papaveri* K. Sawada sp. nov., parasitic on *Papaver somniferum* in Formosa, *Fusicladium theae* K. Hara sp. nov., on leaves of *Thea sinensis*, *Mycosphaerella theae* K. Hara sp. nov., parasitic on leaves of *Thea sinensis*, *Mycosphaerella Ikedai* K. Hara sp. nov., saprophytic on leaves of *Thea sinensis*, *Meliola citricola* K. Hara sp. nov., epiphytic on leaves, branches, and fruits of *Citrus* spp., and *Gloeosporium Cartharni* Hori and Hemmi comb. nov.—*H. R. Rosen*.

472. WAKEFIELD, E. M. *Galactinia amethystina* (Phill.) Wakef. Trans. British Mycol. Soc. 6: 375. 1920.—This is the plant formerly called *Galactinia Phillipsii* (Cke.) Boud., or, still earlier, *Ascobolus amethystinus* Phill.—W. B. McDougall.

473. WAKEFIELD, E. M. The Painswick Foray. Trans. British Mycol. Soc. 6: 299-302. 1920.—The Spring Foray, which was held at Painswick, Gloucestershire, from May 21 to May 25, 1920, is described and a complete list of the fungi collected, numbering about 125 species, is given.—W. B. McDougall.

474. WAKEFIELD, E. M., AND A. A. PEARSON. Records of Surrey resupinate Hymenomyces. Trans. British Mycol. Soc. 6: 317-321. 6 fig. 1920.—Sixteen species are listed, in most cases with descriptive notes.—W. B. McDougall.

475. WILTSHIRE, S. P. The production of conidia in pure cultures by the brown rot fungus of the apple. Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 34-36. 1919.—Attempts to secure abundant production of conidia by *Sclerotinia fructigena* in pure culture are reported. Varieties of apples supposed to develop upon inoculation brown rot and abundant conidia, instead of black rot and no conidia, failed to do so.—The best medium found for production of conidia is sliced potato soaked in 7.5 per cent malic acid. Plum wood extract with 1 per cent malic acid also gives excellent production of conidia.—D. Reddick.

476. YORK, H. H. Late seasonal production of aecia of *Cronartium ribicola*. Phytopath. 10: 111. 1920.—Freshly matured aecia were found on *Pinus strobus*, on Sept. 16, 1919.—D. Reddick.

LICHENS

477. CHURCH, A. H. The lichen symbiosis. Jour. Botany 58: 213-219, 262-267. 1920.—The generally accepted teaching is that lichens consist of a fungus and an alga living very closely together in symbiotic relationship, the whole forming a "consortium." The difficulty of convincing a student that in lichens any symbiotic relation exists is noted. To determine whether mutual benefit occurs in all cases is difficult; also the consortium is ill-defined, especially in cases of symbiosis of fungi with filamentous algae and higher plants where there is a complete gradation to purely parasitic conditions. The fungi are always normal ascomycetes or basidiomycetes, and have not been modified by the association. It is the vegetative part or thallus that has been so remarkably modified by the cohabitation. The important factor is *dual control*. Simple cohabitation is not the sole factor in the consortium. Dual control is a biological futility like a house divided against itself, and, hence, doomed to rapid extinction. The alga gains little if anything from the association with the fungus. The views held by SACHS, WEST, SCHENK, and GOEBEL are discussed, it being noted that much in their statements is deductive rather than inductive. The relation of the whole question of the evolution of dorsal-ventral organs, or even axial structure, through the enormously long period of emergence from the phytobenthon of the sea is noted. Yet there is something about lichens, neither fungus nor alga, but a form factor, which produces a soma readily distinguished by the collector, and the cause of which must be found and explained. There is nothing in symbiosis to show why *Cladonia* should have a centric habit and *Parmelia* a dorsiventral habit in the same environment. Any effect of symbiosis in this matter is doubted, and the relation of lichen form to alga form is pointed out. REINKE held that the similarity of form in distinct phyla as in lichens and algae was due to the effect of similar conditions; but the conditions surrounding sea-weeds and lichens are not similar. The question is raised whether lichens, or rather the fungus part of lichens, do not actually inherit their form from algae. Lichens would thus represent a deteriorating race of algae arrested in deterioration by the intrusion of algal units of a lower degree.—K. M. Wiegand.

478. LYNGE, B. Index specierum et varietatum Lichenum quae collectonibus "Lichenes exsiccati" distributae sunt. (Forts.) [Index of species and varieties of Lichenes which were distributed in the collections of "Lichenes exsiccati." (Continued.)] Nyt. Mag. Naturvidenskab. 56: 385-464. 1919.

479. MERESCHKOVSKY, C. On some new forms of lichens. *Ann. and Mag. Nat. Hist.* 6: 482-489. 1920.—The author gives a brief description in Latin followed by one in French of the following forms of lichens: *Physcia pulverulenta*, formae *delicata*, *turgidula*, and *elegantella*, and varieties *lepidota*, *aquiloides*, and *angustata*. *Physcia virella*, formae *dendrilobata*, and *dendrilobata* subforma *tenerrima*. *Physcia hispida*, forma *auriculata*. *Squamaria muralis*, formae *convexiuscula* and *granulata*, and var. *flexuosa*. *Parmelia conspersa*, forma *dispersa*, and varieties *diffRACTA*, *digitulata* forma *intermedia*, and *isidiata* forma *heteroclyta*. *Anaptychia ciliaris*, formae *helianthus* and *submarginata*. *Cetraria hiascens*, forma *delicatula*. *Caloplaca teicholyta*, forma *nivalis*. *Dermatocarpon aquaticum*, var. *nervosum*. *Biatora kreyeri*.—H. H. Clum.

480. PAULSON, ROBERT. Lichens found near Painswick. *Trans. British Mycol. Soc.* 6: 303-304. 1920.—A list is given of about 45 species of lichens collected near Painswick, Gloucestershire, during the Spring Foray of May, 1920, together with brief notes on habitat relations.—W. B. McDougall.

BACTERIA

481. ANONYMOUS. The rate of speed at which bacteria travel. *Sci. Amer.* 123: 441. 1920.

482. WOLF, F. A. A bacterial leafspot of velvet bean. *Phytopath.* 10: 73-80. 2 fig. 1920.—A description of a hitherto undescribed leafspot disease of Florida velvet beans caused by *Aplanobacter stizolobii* n. sp.—J. G. Dickson.

MYXOMYCETES

483. CURRIE, MARY E. A critical study of the slime-molds of Ontario. *Trans. Roy. Canadian Inst.* 12²: 247-308. Pl. 8-10. 1920.—Of the 28 genera and 110 species and varieties reported from Ontario, 47 species and varieties are here recorded from Ontario for the first time, 36 of them being new to Canada. Three species and 1 variety are reported as new to North America, viz., *Badhamia foliicola* Lister, *Diachaea bulbilosa* Lister, *Stemonitis fusca* Roth. var. *confluens* Lister, and *Stemonitis flavogenita* Jahn. The plasmodia of 2 species have been noted for the first time. Five forms have been observed parasitizing fungi and 9 have been found fruiting on, and in some cases causing injury to, the leaves or stems of herbaceous plants.—R. B. Thomson.

PALEOBOTANY AND EVOLUTIONARY HISTORY

E. W. BERRY, *Editor*

(See also in this issue Entries 704, 705)

484. ANONYMOUS. Contemporaneous evolution of warm-blooded animals and of flowering plants. [Rev. of: BERRY, E. W. Evolution of flowering plants and warm-blooded animals. *Amer. Jour. Sci.* 49: 207-211. 1920.] *Sci. Amer. Monthly* 1: 558-559. 1920.

485. CARPENTIER, ALFRED. Sur quelques végétaux silicifiés des environs de Sainte-Marie-aux-Mines [Alsace]. [On some silicified plant remains in the region of Sainte-Marie-aux-Mines.] *Compt. Rend. Acad. Sci. Paris* 171: 250-252. 1920.—The rocks of this region are found to contain roots of *Psaronius*, sporanges of *Pteridotheca*, petioles of *Medullosa*, pollen of *Cordaitea* and other gymnosperms, and leaves of the *Cordaitales*.—C. H. Farr.

486. CLARKE, J. M. The oldest of the forests. *Sci. Monthly* 12: 83-91. 6 fig. 1921.—Devonian conditions were not favorable for preserving trees. But trees, mostly fern-like, were not sparse and scattered. Until recently the richness of the Catskill hills in the relics of the Devonian forests has not been realized. An expedition this year brought 5000 pounds

of their remains for museum purposes.—A great autumn freshet of the upper Schoharie in 1869 revealed in the bed rock of the hills a series of standing stumps of trees all at the same level in the rocks and their rootlets in the original mud, now shale, thus revealing the most ancient forest yet known. These trees are preserved at least at two levels in the rock, one 60 feet above the other.—*L. Pace.*

487. HOLTENDAHL, O. Occurrence of structures like Walcott's Algonkian Algae in the Permian of England. *Amer. Jour. Sci.* 1: 195-206. *Fig. 1-8.* 1921.—Forms from the English Permian are described and illustrated that greatly resemble the Algonkian forms called *Newlandia* and *Greysonia* by Walcott, and that are considered as in all probability secondary structures and not of organic origin.—*E. W. Berry.*

488. KRÄUSEL, R. Die fossilen Koniferenhölze (unter Ausschluss von Araucarioxylon Kraus). Versuch einer monographischen Darstellung. [Attempt at a monographic treatment of fossil coniferous wood, exclusive of Araucarioxylon.] *Palaeontographica* 62: 185-275. 1919.—A monographic treatment of fossil coniferous woods, giving besides an alphabetic list of the hitherto described species (with bibliographic references, synonymy, and horizons); also a historical introductory section and a systematic synopsis of the recognizable forms (with corresponding existing forms, horizons, and localities). The author dissents from JEFFREY's view of the relationships among the coniferous families, and on the basis of histologic studies by himself and other students, holds that the Araucariaceae are the older and the Abietineaceae the younger groups. The bibliography comprises 243 titles.—*Saml. W. Geiser.*

489. KRÄUSEL, R. Palaeobotanische Notizen. *Senckenbergiana* 2: 198-215. 1920.—This communication comprises three parts. The first, p. 198-204, consists of additions to this author's recently published monograph on fossil coniferous woods (see Bot. Absts. 8, Entry 488). The second, "Zur Bestimmung fossiler Koniferenhölzer" [The determination of fossil coniferous woods], is a 4 page summary of current ideas. The third, "Über die Lignite von Senftenberg [Upon the lignite of Senftenberg], gives the results of a study of the wood structures from this Miocene horizon which is widespread in Saxony, Silesia, Mecklenburg, Mark Brandenburg, etc. The author determined the percentage representation of *Taxodium* and *Sequoia* in the lower, middle, and upper parts of the lignite in the various mines at Senftenberg, and discusses the probable ecology.—*E. W. Berry.*

490. KRAUSEL, R. Nachträge zur Tertiärflora Schlesiens. III. Über einige Originale Goepperts und neuere Funde. [Additions to the Tertiary flora of Silesia. III. Upon some of Goeppert's types and new collections.] *Jahrb. Preuss. Geol. Landes.* 40: 363-433. *Pl. 5-15.* 1920.—This paper concerns itself with Goeppert's types and with new collections from Ruppertsdorf, Peruschen, Oppatowitz, and Bluschau. No new forms are described but the older determinations are revised. Species in the following genera are discussed: *Woodwardia*, *Pteris* (2), *Salvinia*, *Pinus*, *Taxodium*, *Glyptostrobus*, *Sequoia*, *Taxodioxyton*, *Libocedrus*, *Widdringtonia*, *Salix* (2), *Populus* (2), *Myrica*, *Juglans* (3), *Hicoria*, *Pterocarya*, *Carpinus*, *Betula* (2), *Castanea*, *Quercus*, *Ulmus* (2), *Zelkova*, *Cinnamomum*, *Persea*, *Philadelphus*, *Liquidambar*, *Platanus*, *Crataegus*, *Rhus*, *Acer* (4), *Paliurus*, *Vitis*, *Grewia*, *Buettneria*, *Cornus*, and several undetermined types. All are of Miocene age, those from Bluschau and Oppatowitz being regarded as older than Schosnitz (Tortonian) and those from Peruscher being regarded as younger (presumably Sarmatian).—*E. W. Berry.*

491. LOZANO, E. D. Depositos diatomiferos en el valle de Toxi, Ixtlahuaca, Estado de Mexico. [The diatomaceous deposits of the Toxi Valley, Mexico.] *An. Inst. Geol. Mexico* 9: 1-19. *Pl. 1-5.* 1920.—The author describes the diatomaceous deposits of the valley of Toxi and records and figures diatoms representing the genera *Synedra*, *Surirella*, *Coscinodiscus*, *Cyclotella*, *Gaillonella*, *Encyonema*, *Epithemia*, *Navicula*, and *Pleurosigma*. The deposits were laid down subsequent to the volcanic rocks of the region and are considered of fresh water origin and Pleistocene age.—*E. W. Berry.*

492. REID, E. M. *Recherches sur quelques graines pliocènes du Pont-de-Gail (Cantal).* [Studies of Pliocene seeds from Pont-de-Gail, Cantal.] Bull. Soc. Géol. France IV, 20: 48-87. Pl. 3-4. 1920.—Total number of varieties reported is 48 of which 37 are positively determined and 17 of these are new and include species of *Sparganium*, *Stratiotes*, *Carpinus*, *Fagopyrum*, *Ranunculus*, *Menispermum*, *Polanisia*, *Myriophyllum*, *Symplocos*, *Lycopus*, *Sambucus*, *Trichosanthes* and a new genus, *Diclidocarya*, of unknown botanical affinity and also present in the Pliocene of Holland. The age is considered to be lower Pliocene and the flora contains a large exotic and extinct element with a pronounced southeastern Asiatic and North American facies. There is an elaborate discussion, the gist of which has already been given in the abstract of this author's subsequently published paper on Pliocene floras. A complete bibliography and two plates complete the paper.—*E. W. Berry.*

493. REID, E. M. *Recherches sur quelques graines pliocènes de Pont-de-Gail (Cantal).* [A study of the Pliocene seeds of Pont-de-Gail.] Compt. Rend. Sommaire Soc. Geol. France 6: 49-51. 1920.—Seeds of 48 species of plants from the lower Pliocene of Central France are recorded. Of these, 18 are new and 5 are exotics now dwelling in southeastern Asia. A detailed account is promised in a future publication.—*E. W. Berry.*

494. STOPES, M. C. *Paleobotany in 1918.* Sci. Prog. [London] 14: 396-398. 1920.—A brief review of the most important papers published in this field during 1918.—*J. L. Weimer.*

495. THIESSEN, R. *Structure in Paleozoic bituminous coals.* U. S. Bur. Mines Bull. 117. 296 p., 160 pl. 1920.—This paper gives the results of several years study of coal structures. A historical summary is followed by an account of the methods of study. The origin and structure of modern peat is discussed and it is shown that coal had a similar origin and shows comparable structure and plant content. The coals described in detail comprise samples from Pennsylvania, West Virginia, Indiana, Illinois, Iowa, and Alabama, all from bituminous mines and of Carboniferous age. Coal is shown to consist of the three elements long recognized, namely, the charcoal, or "mother of coal," and compact coal, the latter consisting of alternating laminae of dull coal (matt, canneloid, sapanthrakon) and bright bands (glanz, humus, jet, carbohumins, lignitoid, hydrocarbon), the anthraxylon of the author. The dull laminae are shown to be made up of former woody parts in a more finely divided state than in the bright bands and imbedded in a ground mass of finely divided debris which the author calls the *attritus*. The *attritus* consists chiefly of woody degradation products along with traces of cuticles, spore and pollen exines, and resinous particles of various origins. The bright laminae are shown to consist largely of small chips of semi-decayed woody tissues. Many plant fragments of various plant parts and a variety of exines are discussed and figured but no attempt is made to assign names to any of them except a *Medullosa* stem, which is identified as *Medullosa anglica*. The report is profusely illustrated.—*E. W. Berry.*

PATHOLOGY

G. H. COONS, *Editor*

C. W. BENNETT, *Assistant Editor*

(See also in this issue Entries 8, 15, 25, 54, 158, 173, 181, 386, 397, 456, 459, 475, 476, 482, 483, 611, 612, 675, 678, 682, 688)

PLANT DISEASE SURVEY; REPORTS OF DISEASE OCCURRENCE AND SEVERITY

496. ANONYMOUS. *Chemistry in plant distribution.* Sci. Amer. Monthly 1: 562-563. 1920.—The use of methyl red to indicate whether or not a soil is sufficiently acid to grow scab-free potatoes is explained.—*Chas. H. Otis.*

497. ARTHUR, J. C. *Two destructive rusts ready to invade the United States.* [Abstract.] Phytopath. 10: 65-66. 1920.

498. GRAVATT, G. F. The chestnut blight in the southern Appalachians. *Amer. Forestry* 26: 606-607. 1920.—It is predicted that the chestnut growth of the southern Appalachians will be killed off just as the growth from New York south to southern Virginia is being killed.—*Chas. H. Otis*.

499. JOHNSON, A. G., J. G. DICKSON, AND HELEN JOHANN. An epidemic of *Fusarium* blight (scab) of wheat and other cereals. [Abstract.] *Phytopath.* 10: 51. 1920.

500. LYMAN, G. R. The 1919 survey for potato wart. [Abstract.] *Phytopath.* 10: 60-61. 1920

501. STEVENS, F. L. Foot-rot of wheat and its fungous associates. [Abstract.] *Phytopath.* 10: 52. 1920.

THE HOST (RESISTANCE, SUSCEPTIBILITY, MORBID ANATOMY AND PHYSIOLOGY)

502. ANONYMOUS. Bladrulesyge hos Tomater. [Leaf-roll of tomatoes.] *Gartner-Tidende* [København] 36: 123. 1920.—The rolling of the leaves often seen in tomatoes cannot be compared to the leaf-roll of potatoes, but is a reaction following heavy pruning. Individual plants or certain forms may be more inclined to roll than others.—*Ernst Gram*.

503. FRANGOS, G. A vine plant immune to *Oidium*. *Cyprus Agric. Jour.* 15: 146. 1920.—A vine plant on the Heloan Farm at Alethrico was observed in August, 1919, to be quite free from mildew (*Uncinula necator*) while all the others were badly affected. Inquiry regarding the source of this vine revealed the fact that it had been obtained from Ayios Ambrosios and was known as "Laorcas." It is proposed to test thoroughly the persistency of immunity of the vine to *Oidium*.—*W. Stuart*.

504. FROMME, F. D. The development of loose smut of wheat as modified by soil fertility. [Abstract.] *Phytopath.* 10: 53. 1920.

505. HODSON, E. R. Is American chestnut developing immunity to the blight? *Jour. Forestry* 18: 693-700. 1920.—The chestnut blight does not appear controllable by ordinary methods but observations appear to show that immunity is developing or that individuals are resistant. As the chestnut sprouts at the base, the organism may live for two or three decades and in this period immunity, which is the only hope for forest stands, may actually develop. Two types of canker are recognized, atrophy, a depressed surface, and hypertrophy, a swollen distorted condition. In the first the plant makes no resistance to the disease, while in the second there is resistance to the invader. Immunity development requires time, of which the apparent recovery of living tissue after a long period of attack appears to be evidence. Long-time observations under forest conditions of actual developments are necessary to determine whether the hypothesis is substantiated.—*E. N. Munns*.

506. HOLBERT, J. R., JAMES G. DICKSON, AND H. HOWARD BIGGAR. Correlation of early growth variation and productivity of maize as influenced by certain pathologic factors. [Abstract.] *Phytopath.* 10: 57-58. 1920.

507. JOHNSON, A. G., AND W. W. MACKIE. Evidence of disease resistance in barley to attacks of *Rhynchosporium*. [Abstract.] *Phytopath.* 10: 54. 1920.

508. JONES, L. R., J. C. WALKER, AND W. B. TISDALE. Fifth progress report of *Fusarium*-resistant cabbage. [Abstract.] *Phytopath.* 10: 64. 1920.

509. McCLINTOCK, J. A. Field tests with strains of wilt-resistant tomato seed in 1919. [Abstract.] *Phytopath.* 10: 59. 1920.

510. MELCHERS, L. E. The resistance shown by three hard winter wheats, Kanred (P762), P1066, and P1068 to plant diseases. [Abstract.] *Phytopath.* 10: 52. 1920.

511. MELCHERS, LEO E., AND JOHN H. PARKER. The resistance of Kanred (P762), P1066, and P1068, three hard winter wheats, to leaf rust. [Abstract.] *Phytopath.* 10: 52-53. 1920.

512. RUMBOLD, CAROLINE. Causes for the production of pathological xylem in the injected trunks of chestnut trees. *Phytopath.* 10: 23-33. 2 pl. 1920.—The author concludes that the production of pathological xylem in the phloem region of the trunks of injected chestnut trees [*Castanea dentata*] is due to (1) the mechanical severance of vascular tissues, and (2) the chemical stimulation of cells.—J. G. Dickson.

513. WOODWORTH, C. M., AND FLORENCE COERPER BROWN. Studies on varietal resistance and susceptibility to bacterial blight of the soy bean. [Abstract.] *Phytopath.* 10: 68. 1920.

THE PATHOGENE (BIOLOGY, INFECTION PHENOMENA, DISPERSAL)

514. CLAYTON, E. E. The relation of soil temperature to the development of the tomato *Fusarium* wilt. [Abstract.] *Phytopath.* 10: 63-64. 1920.

515. HUNGERFORD, CHAS. W., AND A. E. WADE. Relation between soil moisture and bunt infection in wheat. [Abstract.] *Phytopath.* 10: 53. 1920.

516. JONES, L. R., AND H. H. MCKINNEY. The influence of soil temperature on the development of potato scab. [Abstract.] *Phytopath.* 10: 63. 1920.

517. MACINNES, JEAN. The effect of temperature and light on *Fusarium* sp. causing wheat scab. [Abstract.] *Phytopath.* 10: 52. 1920.

518. ROSENBAUM, J. Infection experiments on tomatoes with *Phytophthora terrestris* Sherb. and a hot water treatment of the fruit. *Phytopath.* 10: 101-105. 1920.—The writer found that because of its effect on zoospore liberation, an abundant moisture supply in diseased soil is necessary to produce an epidemic infection with *P. terrestris*. The addition of copper sulphate solution (1:5000) to infested soil prevented infection of green tomatoes when in contact with the soil. The immersion of green tomatoes in water at 60°C. for 1½ minutes prevents spread of the rot where the infection is very recent and the fungus has not penetrated deeply into the tissues.—J. G. Dickson.

519. ROSENBAUM, J. Studies with *Macrosporium* from tomatoes. *Phytopath.* 10: 9-22. 2 pl., 1 fig. 1920.—A study of the early blight, or "nail head" spot, of the tomato is summarized, the author drawing the following conclusions: Infection takes place without previous injury to the fruit, however only on the immature fruit; the disease does not originate in transit on mature fruit picked from an infected field, but it may develop in transit on immature fruit picked from infected fields; the disease does not spread from infected fruit to adjacent healthy fruit in transit. The author concludes that the causal organism of the "nail head" spots on fruits, stems, and leaves of the tomato is different specifically from *Macrosporium solani* from potatoes and suggests the use of the binomial *M. tomato* Cooke.—J. G. Dickson.

520. TISDALE, W. B. The relation of soil temperature and soil moisture to the occurrence of cabbage yellows. [Abstract.] *Phytopath.* 10: 63. 1920.

521. WHITE, J. H. On the biology of *Fomes applanatus* (Pers.) Wallr. *Trans. Roy. Canadian Inst.* 12: 133-174. Pl. 2-7, fig. 1-2. 1920.—The investigations have followed along three main lines of inquiry: (1) The study of the morphology and ecology of *F. applanatus* and of the action on its host; (2) a determination of etiological relationships by culture methods, and a testing of the applicability of such methods to a study of timber destroying

fungi; (3) a search for possible criteria by which parasitic attacks on wood may be distinguished from saprophytic action. The particular type of decay in timber due to *F. applanatus* has now by actual culture been linked with its causal agent. The species has been proved to be a wound parasite, in southern Ontario one of the commonest and most destructive. The occurrence of wound gum and the multiplication of tyloses in a band marking the advance of a wood destroying fungus in a living tree would appear to furnish an unerring criterion for the recognition of a fungus as a parasite.—*R. B. Thomson.*

522. WILTSHIRE, S. P. **The apple canker fungus.** Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 23-29. 1919.—*Nectria ditissima* ejects its ascospores so that pure cultures were obtained by the inverted plate method. Mature perithecia were secured on malt extract agar in tubes.—Critical temperatures for the fungus in culture are: Minimum about 5°, optimum, 20-22°, maximum about 30°C.—Infection through young buds was very abundant in 1918. The spores and mycelium were found abundantly on bud scales in September but it is not yet established that the fungus penetrates in the absence of injury. Infections about galls produced by woolly aphid were confined to those that had broken open.—*D. Reddick.*

DESCRIPTIVE PLANT PATHOLOGY

523. ANONYMOUS. **Gulbladede Hortensier.** [Yellows of Hydrangea.] Gartner-Tidende [København] 36: 139. 1920.—Hydrangea should be planted in rather light soil not too rich in manure. The yellows may be caused by too heavy soil, presence of manure, drought, or starvation.—*Ernst Gram.*

524. BENNETT, C. W. **Phoma root-rot of celery.** [Abstract.] Phytopath. 10: 67. 1920.

525. BROWN, NELLIE A., AND R. B. HARVEY. **Heart rot, rib rot, and leaf spot of Chinese cabbages.** Phytopath. 10: 81-90. 4 fig. 1920.—The Chinese cabbage (*Brassica pekinensis* and *B. chinensis*) is subject to the black rot disease of the common cabbage produced by *Bacterium campestris*, and, as in the common cabbage, there may be also a rapid secondary infection by a soft rot organism. High temperature and excessive moisture favor the development of the disease. Control measures are suggested.—*J. G. Dickson.*

526. BURGER, O. F. **Decay in citrus fruits during transportation.** Monthly Bull. Dept. Agric. California 9: 365-370. 1920.—Lemon decay (due to *Phomopsis citri*), a disease new to California lemons, was found in California during the season 1919-20. The writer discusses the economic importance of stem-end rot and blue-mold decay on citrus fruits in transportation. Stem-end rot infection takes place in the field. To insure sound fruit the disease should be eliminated from the groves. Proper methods of handling, packing, and shipping are given for blue-mold decay control.—*E. L. Overholser.*

527. BYARS, L. P. **A disease of red clover and strawberry in the Pacific Northwest caused by the nematode *Tylenchus dipsaci* (Kühn) Bastian.** [Abstract.] Phytopath. 10: 66. 1920.—See Bot. Absts. 8, Entry 528.

528. BYARS, L. P. **A nematode disease of red clover and strawberry in the Pacific Northwest.** Phytopath. 10: 91-95. 2 pl. 1920.—A disease caused by *Tylenchus dipsaci* is described. [See Bot. Absts. 8, Entry 527.]-*J. G. Dickson.*

529. CHEN, CHUNJEN C. [A study of American cotton diseases.] Hua-Shang-Sha-Chang-Lien-Ho-Hui-Ki-Kau [China Cotton Jour.] 14: 245-256. 1920.—The cause, symptoms, means of transmission, and control of the following important cotton diseases are reviewed: Angular leaf spot, anthracnose, wilt, root-knot, potash-hunger, damping-off, root rot, Diplodia boll rot, shedding of bolls and squares, and leaf spot. The reduction in cotton yield in the United States due to diseases is discussed and statistics are given. The author also points out the

possibility of introduction of serious diseases into China through the large importation of American cotton seeds, and urges the Chinese cotton growers to practise the precaution of seed fumigation.—*Chunjen C. Chen.*

530. COOK, MEL. T. The *Alternaria* fruit rot and *Rhizoctonia* stem rot of tomatoes. [Abstract.] *Phytopath.* 10: 59. 1920.

531. COOK, MEL. T. Blossom blight of the peach. [Abstract.] *Phytopath.* 10: 64-65. 1920.

532. COOK, O. F. A disorder of cotton plants in China: Clubleaf or cyrtosis. *Jour. Heredity* 11: 99-110. 1 pl., fig. 1-9. 1920.—A disease of the mosaic type is described as being destructive to cotton in China. Diseased plants develop a large number of shoots which give them a "witches' broom" appearance. The nodes are short and the leaves small and crinkled, often colored different shades of green, yellow, and red. The disease is believed to be infectious. Leafhoppers are suspected as agents of dissemination.—*C. W. Bennett.*

533. CROMWELL, RICHARD O. Recent studies on *Septoria* of wheat. [Abstract.] *Phytopath.* 10: 51. 1920.

534. DELACROIX, JORGE. Enfermedades de las plantas cultivadas. Enfermedades no parasitarias. [Diseases of cultivated plants. Non-parasitic diseases.] 12 × 18 cm., 392 p., 57 pl. Casa Editorial, P. Salvat: Barcelona, 1920.—A Spanish translation from the French edition, published as part of the "Enciclopedia Agricola."—*John A. Stevenson.*

535. DELACROIX, JORGE, Y ANDRÉS MAUBLANC. Enfermedades de las plantas cultivadas. Enfermedades parasitarias. [Diseases of cultivated plants. Parasitic diseases.] 12 × 18 cm., 457 p., 87 pl. Casa Editorial, P. Salvat: Barcelona, 1919.—A Spanish translation from the second French edition, published as part of the "Enciclopedia Agricola."—*John A. Stevenson.*

536. DURRELL, L. W. The purple sheath spot of corn. [Abstract.] *Phytopath.* 10: 54-55. 1920.

537. GLOYER, W. O. Apple blister canker. [Abstract.] *Phytopath.* 10: 58. 1920.

538. HARTLEY, CARL, AND GLENN G. HAHN. Notes on some diseases of aspen. *Phytopath.* 10: 140-147. 3 fig. 1920.—*Populus tremuloides* is found in certain regions to be unusually subject to disease. Trunk cankers in these regions seem to be important factors in shortening the life of the trees. *Fomes igniarius* is a frequent cause of premature death. The occurrence is also noted of (1) a twig blight suggesting in appearance the fire blight of pear; (2) leaf killing by *Sclerotium bifrons* E. & E., found in both the East and the West, and also attacking Lombardy poplar; (3) a bark blackening of obscure origin which prevents propagation by cuttings.—*Carl Hartley.*

539. HARVEY, R. B. Some enemies of the potato. *Sci. Amer. Monthly* 2: 120-122. Fig. 1-9. 1920.—The mechanism by which the hyphae of the "damping-off" fungus, *Pythium deBaryanum*, push through a cell wall barrier is described. Experimenting with slices of potato 3 or 4 cells thick and watching the process through the microscope, it was found that a hypha penetrates the cell wall in 5 minutes. The author believes that this is entirely too short a time to account for the breaking down of the cell wall by enzyme action. Zoospore dispersal of *Phytophthora infestans* is also illustrated.—*Chas. H. Otis.*

540. HOLBERT, J. R., AND G. N. HOFFER. Corn root and stalk rots. [Abstract.] *Phytopath.* 10: 55. 1920.

541. JONES, FRED RUEL. *Pythium* as a causal factor in "pea blight." [Abstract.] *Phytopath.* 10: 67. 1920.

542. McCUBBIN, W. A. A heart rot of peach. [Abstract.] *Phytopath.* 10: 65. 1920.
543. MORRIS, R. T. Hazel nuts. *Amer. Nut Jour.* 12: 57. 1920.—The fungus *Cryptosporella anomata* (Sacc.) appears to be the only factor preventing the successful introduction of foreign hazels into the U. S. A., though other enemies are also present. A depressed area in the bark with a swollen overhang of healthy bark around the margins characterizes infections by hazel blight. Effective control is possible by removing diseased tissues and spraying with Bordeaux mixture.—E. L. Overholser.
544. NEAL, DAVID C. Phony peaches: A disease occurring in middle Georgia. *Phytopath.* 10: 106-109. 1 pl., 1 fig. 1920.—A disease of peach at present restricted to the peach belt of middle Georgia, U. S. A., and frequently confused with "collar edema," is here described under the name common among growers. The disease is characterized by vivid green leaves which are larger than normal and hang on short, stubby branches. "As a result, the entire head of the tree is reduced to a rather compact shape, owing to the foreshortened internodes and resulting close spacing of the leaves." The amount of fruit set is small, low in quality, and late in ripening. All varieties have been found affected. The disease, the etiology of which is not discussed, has been found on 6-year-old seedlings.—G. H. Coons.
545. ORTON, W. A. Streak disease of potato. *Phytopath.* 10: 97-100. 1 pl., 1 fig. 1920.—Streak first appears on upper full grown leaves as elongated or angular spots which follow the veinlets and extend into the parenchyma. Longitudinal streaks soon appear on the petiole, which soon collapses; the hanging dead leaves are characteristic. Following this the stem turns brown and dies, beginning at a point below the tip. Tubers are not affected except as the period of growth is shortened. There is discoloration in cortex. Varieties Factor (European), Rural New Yorker, and many hybrid seedlings are susceptible. American varieties are more resistant than are European. Attempts to isolate a pathogenic organism from lesions have failed. The disease is not to be confused with advanced stages of leaf-roll or mosaic. It has been seen in northern U. S. A. from coast to coast but has not become more prevalent in 7 years.—Donald Reddick.
546. REDDY, C. S., AND W. E. BRENTZEL. Flax canker, a non-parasitic disease. [Abstract.] *Phytopath.* 10: 66-67. 1920.
547. ROSENBAUM, JOSEPH. A stem disease of tomato caused by *Macrosporium solani* E. and M. [Abstract.] *Phytopath.* 10: 59. 1920.
548. SPENCER, E. R. Black crust of Brazil nuts. [Abstract.] *Phytopath.* 10: 61. 1920.
549. STOVER, W. G. Some results of corn root rot work in Ohio. [Abstract.] *Phytopath.* 10: 55. 1920.
550. WANG, K. W. [Some cotton diseases.] Khu-Shou [Science-Publ. Chinese Sci. Soc.] 5: 1057-1062. 1920.—Diseases of cotton reviewed as to their causes and symptoms are yellow leaf blight (*Macrosporium nigricantium*), leaf spot, shedding of bolls, angular leaf spot (*Bacterium malvacearum*), wilt (*Fusarium vasinfectum*), damping-off (*Rhizoctonia* sp.), anthracnose (*Glomerella gossypii*), root rot (*Ozonium omnivorum*), leaf blight (*Mycosphaerella gossypina*), areolate mildew of cotton (*Ramularia areola*), boll rot (*Bacterium* sp.), and root knot (*Heterodera radicicola*). A list of literature cited is also appended.—Chunjen C. Chen.
551. WILTSHIRE, S. P. A dieback of red currants. *Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol* 1919: 30-33. 1919.—Branches of red currant suddenly wilt and die. This may happen at any time but is most noticeable in July. Cortex and wood of affected plant are infested with mycelium. *Cytosporina ribis* and *Nectria cinnabarina* have been isolated in culture and both are under test.—D. Reddick.

ERADICATION AND CONTROL MEASURES

552. ANONYMOUS. Certification of stocks of varieties of potato which are immune from wart disease. Scottish Jour. Agric. 3: 52-66. 1 pl. 1920.—The Board of Agriculture of Scotland has undertaken the enforcement of regulations prohibiting the planting of susceptible varieties in infected lands and is inspecting fields of immune varieties for certification as to varietal purity. No crop is certified which contains more than 0.5 per cent of rogues. Over 17,000 acres of approved immune varieties were certified in 1919. Distinguishing characters of immune varieties and common rogues are given.—H. V. Harlan.

553. ANONYMOUS. Beispiele erfolgreicher Beizung. [Examples of successful seed treatment.] Mitteil. Deutsch. Landw. Ges. 35: 616. 1920.—A brief note giving the results from treating rye with "Uspulin" and with "Fusariol" against *Fusarium* as reported by Dr. STEHER, Lübeck, in Zeitschr. Landw. Kammer Braunschweig. Based on a check plot treated with "Uspulin," a loss of 44,800 marks occurred on the untreated portion of the field. Fusariol treatment also resulted in large increases of grain and straw.—A. J. Pieters.

554. BARKER, B. T. P., C. T. GIMINGHAM, AND S. P. WILTSHIRE. Sulfur as a fungicide. Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 57-75. 1919.—Polysulfides possess fungicidal properties and act as contact fungicides. Tests of the decomposition products of polysulfides show that elemental sulfur is the essential fungicidal ingredient of the decomposed solutions. Spores of parasitic fungi are inhibited in germination by the presence of sulfur in hanging drops in the following order: *Sclerotinia fructigena* and *Phragmidium subcorticium*, 100 per cent inhibition; *Cladosporium fulvum*, *Fusicladium dendriticum*, *F. pyrinum*, 50 per cent; *Nectria ditissima*, *Botrytis cinerea*, and *Verticillium* sp. no inhibition.—The acid or alkaline reaction of secretion from germinating spores has no correlation with susceptibility to sulfur, although precipitated sulfur seems to be brought into solution by the secretions of various fungi and apparently to some extent by agar when used as a medium for germination.—D. Reddick.

555. CADORET, A. Les sulphatages après le 15 juillet. [The sulphates after July 15.] Prog. Agric. et Vitic. 70: 9-10. 1918.—From investigations conducted since 1877, it is quite definite that the critical period for infection of *Plasmopara* on the grape (*Vitis vinifera*) is from July 10 to July 15. During this period the vines should be well covered. If the weather continues wet after July 15, a copper spray should be applied every 8 to 12 days. In dry seasons a monthly application is sufficient. In sections where black rot (*Guignardia*) is epidemic, as was the case in 1918, the entire period is longer and it may be necessary to employ 1 per cent Bordeaux mixture from June 10 to harvest-time.—H. B. Smith.

556. COONS, G. H. Experiments on the control of stinking smut of wheat. [Abstract.] Phytopath. 10: 54. 1920.

557. GIMINGHAM, C. T., AND G. T. SPINKS. Soil sterilization. Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol 1919: 37-42. 1919.—Soil infested with *Chrysophlyctis endobiotica*, the cause of potato wart, was placed in small pots and the following substances incorporated with it in the amounts indicated: Bleaching powder 1 gram, creosote 0.5 gram, chloro-picrin 0.3 gram, formalin 1 cc., powdered chalk 1.5 gr. (to neutrality) and 7.5 gr., "cymène" 0.25 gr. Steam-sterilized soil was used as a control. One week later a tuber was planted in each pot. At the same time other pots of the soil were planted and were moistened twice each week with the following solutions: Copper sulfate 2 per cent, sulfur dioxide 0.1 saturated solution, formalin 1 per cent, bleaching powder 1 per cent. Aside from steam sterilization the only agents which reduced the amount of disease to any appreciable extent were copper sulfate, excess of chalk, and perhaps creosote.—Experiments in progress with disinfectants for the control of *Rhizoctonia* on carrots and spinach were discontinued because of the disappearance of the disease. Bleaching powder at the rate of 2 ounces per sq. yd. can be used safely for carrots. When 8 ounces are used severe injury results.—D. Reddick.

558. GLOYER, W. O. Effect of straw mulch on potato leaf roll. [Abstract.] *Phytopath.* 10: 60. 1920.

559. GRAM, E. Uspulum som Afsvampningsmiddel. [Uspulum as a seed disinfectant.] *Ugeskrift Landmaend* [København] 65: 636. 1920.—“Uspulum” (mercuric salt of monochlorophenol) has been somewhat overestimated by certain writers and does not in the Danish experiments equal the standard treatments for cereal smuts and barley stripe. The supposed acceleration of the germination should be more thoroughly investigated before the chemical is recommended.—*Ernst Gram.*

560. HANSEN, H. J. Brugen af modstandsdygtige Stammer af Kaalroer og Turnips paa kaalbroksmittet Jord. [Resistant strains of swedes and turnips on club-root ground.] *Tidskr. Froeavl* [Roskilde] 9: 85–86. 1920.—The author directs attention to the fact that many farmers order resistant strains although they may not have club-root in their fields. The resistant strains are the highest yielders only on contaminated ground, and should be used only there.—*Ernst Gram.*

561. HOPKINS, E. F. Overwintering and control of bur clover leaf-spot. [Abstract.] *Phytopath.* 10: 66. 1920.

562. KEITT, G. W. A preliminary report on apple scab and its control in Wisconsin. [Abstract.] *Phytopath.* 10: 58. 1920.

563. KUNSTLER, J. Sur un traitement préventif de l'oidium. [On a preventative treatment for oidium.] *Compt. Rend. Acad. Sci. Paris* 171: 406–407. 1920.—The dusting of the leaves with flowers of sulfur is recommended.—*C. H. Farr.*

564. MARTIN, WILLIAM H. Sulfur experiments for the control of potato scab. [Abstract.] *Phytopath.* 10: 60. 1920.

565. SPINKS, G. T. Spraying trials. *Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol* 1919: 43–45. 1919.—Varieties of apples and pears susceptible to scab [*Venturia*] were sprayed once just before the blossoms opened. Little scab developed on the unsprayed trees. Bordeaux mixture, copper stearate and Burgundy mixture proved equally effective in controlling the diseases but the latter caused injury to foliage.—*D. Reddick.*

566. STOVER, W. G., F. H. BEACH, AND T. H. PARKS. Results of spraying the apple for blotch in Ohio in 1919. [Abstract.] *Phytopath.* 10: 58. 1920.

567. TEMPLE, C. E. Tomato spraying experiments for the control of *Septoria*. [Abstract.] *Phytopath.* 10: 60. 1920.

568. VILLEDIEU, G. De l'action des eaux météoriques sur les dépôts des bouillies cupriques. [The action of rain water on deposits from copper spraying materials.] *Compt. Rend. Acad. Sci. Paris* 171: 260–263. 1920.—It is found that zoospores of downy mildew [*Plasmopara viticola*] live well in acid media but do not develop in the presence of alkali. It is therefore desirable to have spraying mixtures such that H_2SO_4 will not be generated when the sulfur compounds brought down by rain mix with the spray deposits on the leaf.—*C. H. Farr.*

569. WALKER, J. C. Occurrence and control of black leg of cabbage. [Abstract.] *Phytopath.* 10: 64. 1920.

570. WESTERDIJK, JOHANNA. Das Spritzen der Kartoffeln in den Niederlanden. [Spraying potatoes in the Netherlands.] *Jahresber. Ver. Angew. Bot.* 16: 132–138. 1918.—A résumé of the present status of potato spraying in Holland.—*P. J. Anderson.*

MISCELLANEOUS (COGNATE RESEARCHES, TECHNIQUE, ETC.)

571. BLAIR, R. J. Wood destroying fungi in pulp and paper mill roofs. [Abstract.] *Phytopath.* 10: 61. 1920.

572. BOAS, I. H. The preservation of timber in structures. *Australian Forest. Jour.* 3: 209-212. 1920.—The decay of timber, preservative treatment, and the necessity for proper sanitation in yards are briefly discussed.—*C. F. Korstian.*

573. HARTLEY, CARL. Abnormal growth induced by chloral hydrate soil treatment. *Phytopath.* 10: 334-335. 1 fig. 1920.—The addition of small amounts of chloral hydrate to sandy soil resulted in very abnormal growth of seedlings of *Pinus ponderosa*. The plants during their first few weeks are distinctly larger than normal, and the cotyledons, and in some cases also the first leaves formed, were attached to each other to form sheaths. The same phenomenon, but to a much less marked degree, has been observed in pine seedlings in autoclaved mixtures of soil and compost.—*Carl Hartley.*

574. HUNTOON, F. A., P. MASUCCI, AND EDITH HAMUN. Antibody studies. Part 3. [A preliminary report on the chemical nature of bacterial antibodies.] *Jour. Amer. Chem. Soc.* 42: 2654-2661. 1920.—The antibody molecules are of large size and of colloidal nature. They are unaffected by the enzyme trypsin. They are not precipitated by solutions containing little or no electrolyte. Antibodies are not soluble in ether, nor are they precipitated by a short exposure to 30 per cent NaCl. Dilute alkalis or dilute acids do not injure them. Temperatures as high as 60°C. do not injure them, but they are altered by higher temperatures.—*J. M. Brannon.*

575. KOTILA, J. E. Leaf hoppers and hopperburn of potato leaves. [Abstract.] *Phytopath.* 10: 61-62. 1920.

576. LEEFMANS, S. Kenmerken van bliksemslag bij klappers. [Symptoms of lightning in coconut trees.] In *De Klappertor*. [The coconut beetle.] *Mededeel. Lab. Plantenz. Dept. Landb. Nijv. en Handel [Buitenzorg]* 41: 46-47. Pl. 15. 1920.—Three groups of lightning-injured coconut palms are described, one illustrated by a photograph, to distinguish between lightning injury and beetle injury. One of the groups included 12 trees. The injury involved the sharp drooping of the older leaves, excentric injury to the top, apparently burned lesions with a "scorched" odor, scars running down the trunk and in some cases gum exudation from splits in the lower part of the trunk. The younger leaves which did not immediately droop were apparently scorched at their bases. Natives testified that the trees had been struck by lightning.—*Carl Hartley.*

577. LEES, A. H. Big bud. *Ann. Rept. Agric. and Hort. Res. Sta. Univ. Bristol* 1919: 50-56. 1919.—Big bud of currant is caused by a mite which lives in the interior of the buds. During April, May, and June it is migrating to new buds. Boskoop Giant, introduced as a variety immune to big bud, has proved to be one of the most susceptible. "French" has had a somewhat similar history. Seabrook's Black remains relatively free from big bud in Chelmsford but is affected at Long Ashton. Apparent immunity in Chelmsford is really extreme susceptibility which results in early death of terminal bud and its replacement by a lateral bud. Chelmsford has a dry summer, Long Ashton a moist one. This is thought to affect the growth of the plants sufficiently to account for the differences noted.—*D. Reddick.*

578. RUMBOLD, CAROLINE. Giving medicine to trees. *Sci. Amer. Monthly* 2: 114-116. 5 fig. 1920. [Reprinted from *Amer. Forestry* 26: 359-362. 1920.]—See *Bot. Absts.* 6, Entry 1284.

579. RUTGERS, A. A. L. Bliksemschade bij Hevea. [Lightning injury in Hevea.] *Mededeel. Alg. Proefsta. A. V. R. O. S. [Medan, Sumatra] Rubberserie* 18. 1919.—Reprinted from the *Arch. Rubbercult.* 3: 163-171. 1919.

PHARMACEUTICAL BOTANY AND PHARMACOGNOSY

HEBER W. YOUNGKEN, *Editor*E. N. GATHERCOAL, *Assistant Editor*

(See also in this issue Entries 135, 604, 631)

580. ANONYMOUS. The eradication of weeds. Agric. Gaz. New South Wales 31: 881. 1920.—Attention is called to poison tulip (*Homeria collina*), known to have toxic properties.—L. R. Waldron.

581. CABANNES, E. Contribution à l'étude des propriétés physiologiques et de la posologie du *Geranium maculatum*. [Contribution to the study of the physiological properties and the dosage of *Geranium maculatum*.] Bull. Sci. Pharm. 27: 22-25. 1920.—It was found that therapeutically valuable preparations can be made from the plant and that it may be used as a substitute for rhatany and at times for ergotin, cinchona, and calumba.—H. Engelhardt.

582. DELAUNEY, P. Extraction de glucosides de deux Orchidées indigènes; identification de ces glucosides avec la Loroglossine. [The extraction of glucosides from two orchids and the identification of these glucosides as Loroglossine.] Compt. Rend. Acad. Sci. Paris 171: 435-437. 1920.—A glucoside found in *Orchis Simia* and *Ophrys aranifera* proves to be identical with Loroglossine found, in 1919, in *Loroglossum hircinum*. The various tests are applied.—C. H. Farr.

583. GONNERMANN, M. Der Eisengehalt der Öle, Fette, Wachsarten, Harze, Gummiharze, Gummiarten; sowie einige Analysen über den Gehalt an Kieselsäure und Tonerde. [The iron content of oils, fats, waxes, resins, gum-resins, and gums; also some analyses of silicic acid and alumina content.] Biochem. Zeitschr. 95: 286-295. 1919.—The analyses include materials from animal and vegetable sources, many of the latter being of pharmaceutical interest. Senegal gum appeared to be the only plant material which showed no iron content. The other substances of plant origin showed iron in quantities ranging from a trace to 29.7 per cent.—W. W. Bonns.

584. GORIS, A., ET VISCHNIAC, CH. Constitution du primevérose, de la primevérine et de la primulavérine. [Constitution of primeverose, primeverin and primulaverin.] Bull. Soc. Pharm. 27: 67-70. 1920.—From *Primula officinalis* two glucosides, primeverin and primulaverin, and a sugar, primulaveroase, have been isolated. Primeverin yields on hydrolysis primeverose and the methyl ester of beta metoxyresorcylic acid, while primulaverin is split up into the same sugar and the methyl ester of metametoxyresorcylic acid. Primeverose is composed of glucose and xylose.—H. Engelhardt.

585. GREENISH, HENRY G. Gum Arabic and senna. Pharm. Jour. 105: 448-449. 1920.—Gum Arabic is obtained almost exclusively from *Acacia verek* distributed throughout the African sub-desert from Senegal to Erythraea. Gum is yielded only by those trees located in soil which becomes thoroughly dry during the dry season, only on the younger branches where the cork is thin, and only after wounding or piercing of the bark. It apparently not only serves to seal the wound but also to retain moisture for the plant. All of the nice grades of the gum are obtained from trees artificially wounded or "tapped." Experiments on propagation and the influence of various methods of tapping are under way. Senna is obtained from wild and cultivated plants of *Cassia acutifolia*, but wild plants of *Cassia angustifolia* and *Cassia obovata* are common. Leaflets from cultivated plants are somewhat thinner, narrower, and more elongate than from the wild plants.—E. N. Gathercoal.

586. GUERIN, P., ET A. GORIS. Une nouvelle plante a coumarine: *Melittis melissophyllum* L. [A new source for coumarine: *Melittis melissophyllum*.] Compt. Rend. Acad. Sci. Paris 170: 1067-1068. 1920.—Coumarin is produced by the leaves of this plant, which is related to the official lavender, which also produces it.—C. H. Farr.

587. HOLMES, E. M. Note on Uzara. Pharm. Jour. 105: 507. 1920.—The plant yielding the root constituting this proprietary preparation appears to be *Schizoglossum Shirense*, N. E. Brown, described in Kew Bull. Miss. Inf. 1895: 253. 1895.—E. N. Gathercoal.

588. VAN KETEL, B. A. Een nieuwe methode voor de quantitative bepaling van werkzame bestanddeelen in grondstoffen, in het bijzonder in Kinabast. [A new method for the quantitative estimation of the active principles in drugs and especially in cinchona bark.] Pharm. Weekblad 57: 650-651. 1920.—The following method, which, as the author believes, very probably can be adapted for the estimation of the alkaloids in other plants also, has given good results in the estimation of cinchona alkaloids. Four to 5 gms. of the powdered cinchona bark are mixed with slaked lime and triturated with sufficient ammonia water to obtain a granular mass. This is extracted with chloroform in an extraction apparatus and the solution is evaporated to dryness. As an alternative process the author recommends extracting the mixture of bark, lime, and ammonia with benzene.—H. Engelhardt.

589. LECLERC, H. La verveine (*Verbena officinalis*). [Vervain (*Verbena officinalis*).] Bull. Sci. Pharm. 27: 104-109. 1920.—A short description of this and allied plants and a history of their use in therapeutics.—H. Engelhardt.

590. MASSY. Les goudrons végétaux sur le marché de Meknès (Maroc). [The vegetable tars on the market at Meknès (Morocco).] Jour. Pharm. et Chimie 21: 433-439. 1920.—A chemical study of the tars gatrane er-rekik obtained from the cedar tree, gatrane er-relied obtained from *Thuja*, amine obtained from a tree which probably is *Juniperus phoenicea*, and oil of cade obtained from *Juniperus oxycedrus*.—H. Engelhardt.

591. NETOLITSKY, F. Eine Methode zur makrochemischen Untersuchung von Zellinhaltskörpern. [A method for the macroscopic study of cell inclusions.] Biochem. Zeitschr. 93: 226-229. 1919.—Pulverized plant material was shaken with inactive liquids of high specific gravity (chloroform, carbon tetrachloride, bromoform). The differential sedimentation afforded a means of separating the materials to be examined (crystals, cystoliths, hairs, etc.) from the impurities in the plant powders.—W. W. Bonns.

592. MOOYEN, A. M. Het Urson en zijne verspreiding in het plantenrijk. [Urson and its occurrence in the vegetable kingdom.] Pharm. Weekblad 57: 1128-1142. 1920.—All plants of the Ericaceae contain urson, which is also present in various species of *Epacris*, in crowberry, and in four species of ivy. Urson has the empirical formula $C_{29}H_{47}O.COOH$, forms a well-crystallized methylester and crystallizable potassium and sodium salts. It does not possess a double bond nor does it contain hydroxyl, ketonic, aldehydic, or methoxylic groups.—H. Engelhardt.

593. ROTHEA, F. Toxicité des coques de cacao dans l'alimentation des chevaux et du bétail. [Toxicity of cacao shells when used as feed for horses and cattle.] Bull. Sci. Pharm. 27: 355-356. 1920.—A number of cases of poisoning of horses and other domestic animals were traced to the presence of as much as 0.7 per cent of theobromine and 0.26 per cent of caffeine in the shells. Therefore, only shells from which the alkaloids have been extracted should be used, and it is recommended that such shells be fed only in mixtures with other feed.—H. Engelhardt.

594. TANRET, G. Les alkaloides du grenadier. [The alkaloids of pomegranate.] Bull. Sci. Pharm. 27: 486-493. 1920.—The author discusses and criticizes the work of HESS and EICHEL on this subject and sustains the view of CH. TANRET in regard to the chemical constitution of the various alkaloids in pomegranate.—H. Engelhardt.

595. URK, H. W. VAN. Bijdrage tot de kennis van *Peucedanum sativum* (*Pastinaca sativa* L.) II Mikrochemie en Anatomie. [Contribution to the knowledge of *Peucedanum sativum*. (*Pastinaca sativa* L.) II Microchemistry and anatomy.] Pharm. Weekblad 57: 883-887. Fig. 7.

1920.—The author confirms the presence of an alkaloid in garden parsley; it occurs in all parts of the plant and in those but 1 year old. The root contains a fatty and a volatile oil, together with starch; the amount of fatty oil appears to decrease with increase of starch. Fall seedlings store starch, while in spring seedlings starch is absent. Microscopically the root fibers are similar to, and indistinguishable from, those of Angelica root. An adulteration of garden parsley with Angelica root is highly improbable. *Conium* can easily be distinguished microscopically from garden parsley. It has been claimed that the juice of garden parsley produces dermatitis, but this seems to be due only to an idiosyncrasy of hypersensitive persons.—H. Engelhardt.

596. WAAL, M. DE. Onderzoek naar de insecticide kracht der composieten, in het bijzonder van *Helenium autumnale*. [Experiments in regard to the insecticidal power of the Compositae, especially of *Helenium autumnale*.] Pharm. Weekblad 57: 1100-1107. 1920.—After giving a rather complete review of the insecticidal plants now in general use, the author reports on experiments with different substances claimed to act as insecticides. As test animals, flies, bedbugs, plant-lice, fleas, and cockroaches were used and the following substances were allowed to act on them: Sabadilla seed, pyrethrum, cevadine, opium, extract of belladonna, cannabis, a mixture of cevadine and opium, tobacco, naphthalin, a mixture of borax and sugar, copper acetate, pomegranate, linseed flour, lupulin, blue flag root, anise oil, formaldehyde vapors, chloroform, euphorbium, white mustard seed, kamala, lycopodium, quassia, saponaria root, soap bark, and tumeric. All these substances, with the exception of sabadilla seed and cevadine, gave negative results. These 2 acted on the insects as does insect powder, i.e., they paralyzed the motor nervous center. An examination of more than 100 species of Compositae, grown in Holland, showed that only *Pyrethrum roseum* and *Chrysanthemum cinerariaefolium* possess insecticidal properties. Half-opened blossoms of *Helenium autumnale* exerted only a very slight power and this action is not due to the glucoside present in the flower, but to a volatile oil, pyrethron.—H. Engelhardt.

597. WALLIS, T. E. Analytical microscopy—X. Pharm. Jour. 105: 523-531. 5 fig. 1920. Micrometry and drawing are considered.—E. N. Gathercoal.

598. WESTER, D. H. Het mangaangehalte van eenige Digitalis-soorten van verschillende bodem, en de invloed van een mangaanbemestig. [The content of manganese in some species of Digitalis grown on different soils and the influence of fertilizers containing manganese.] Pharm. Weekblad 57: 660-662. 1920.—Some years ago BURMAN claimed that only *Digitalis purpurea* contains manganese and that it was not present in other species of the genus, such as *D. ambigua*, *D. lutea*, etc., and that the presence of manganese in the ash of digitalis could serve to distinguish the official drug from products of other species of *Digitalis*. The author, however, found that all plants of the foxglove family contain manganese. The ash of the green flowering tops of *D. purpurea* contains 0.7-0.85 per cent; the seeds 3.2-3.7 per cent; and the leaves 1.3-3.2 per cent. In the dry plant parts, the percentages of manganese in the ash are respectively 5.8-9.7, 3.5-4.1, and 6-13. In general the percentage of manganese in *Digitalis* is to be considered as low in comparison with that of other plants. Furthermore, the percentage of manganese varies considerably with the soil in which the plant grows.—H. Engelhardt.

PHYSIOLOGY

B. M. DUGGAR, *Editor*CARROLL W. DODGE, *Assistant Editor*

(See also in this issue Entries 12, 31, 32, 80, 342, 369, 370, 378, 412, 427, 512, 514, 515, 516, 517, 539)

GENERAL

599. ANONYMOUS. [Rev. of: ONSLOW, M. W. *Practical plant biochemistry*. vii + 178 p. University Press: Cambridge, 1920.] *Nature* 106: 176. 1920.—See Bot. Absts. 8, Entry 602.

600. ANONYMOUS. [Rev. of: ZSIGMONDY, R. *The chemistry of colloids*. (Trans. by ELLWOOD, B. SPEAR.) x + 288 p. John Wiley & Sons: New York, 1917.] *Sci. Prog.* [London] 14: 687-688. 1920.

601. MOLISCH, HANS. *Pflanzenphysiologie als Theorie der Gärtnerei*. [Plant physiology as a theory of horticulture.] 3 ed., xi + 326 p., 145 fig. Gustav Fischer: Jena, 1920.—The 2 earlier editions of this work appeared during the war, and consequently are perhaps little known to other than German readers. Further than to note a rather general revision of the book, it is necessary to outline briefly the method of treatment. Nutrition, including salt requirements, soil relations, photosynthesis, transpiration, the movement of food substances, and certain special topics, constitutes about one-third of the book; and, apparently in accord with its purpose, there is no general discussion of metabolism. After a very brief treatment of respiration, about 80 pages are devoted to growth, under which caption is included environmental relations, growth movements, organ formation, and the rest period. In this chapter particularly, many horticultural practises are analyzed. The effects of cold, freezing, are briefly presented; and this is followed by an extended chapter on reproduction, both vegetative and sexual, with ample consideration of such processes and phenomena as grafting, chimeras, parthenocarp, stuffed flowers, etc. In the last 2 chapters there are inextensive accounts of seed germination and of variability, heredity, and plant production.—B. M. Duggar.

602. ONSLOW, M. W. *Practical plant biochemistry*. 178 p. University Press: Cambridge, 1920.—The author presents this book neither as an organic chemistry (an elementary knowledge of which is assumed) nor as a plant physiology, but rather to fill the gap which she conceives to exist between the two fields. A very brief characterization is made in the introduction to the classes of organic compounds in plants; the importance of the synthetic and condensation processes; properties associated with the colloidal state; and the significance of chlorophyll, enzymes, and the regulation and control of metabolism. Nine topics follow, namely, the colloidal state, enzyme action, carbon assimilation, carbohydrates and their hydrolyzing enzymes, the fats and lipases, aromatic compounds and oxidizing enzymes, the proteins and proteases, glucosides and glucoside-splitting enzymes, and the plant bases. In general each chapter treats in appropriate order 2 aspects of the particular topic. On the one hand there is a condensed account of the occurrence, chemical properties and other characteristics of the products included, together with practical directions for experiments on the preparation or identification of the more important groups or compounds. On the other hand brief suggestions are usually given concerning the present knowledge of the course of metabolism, especially the formation and hydrolysis (or decomposition) of the materials discussed, with suitable experiments to demonstrate the action of any enzymes catalyzing the reaction.—The biochemistry of certain special fermentation processes, respiration, and salt nutrition are among the topics not included in this work. At the end of each topic adequate references are given to texts and special articles. [See Bot. Absts. 8, Entry 599.]—B. M. Duggar.

603. SAVAGE, W. G. **Food poisoning and food infections.** viii + 247 p. University Press: Cambridge, 1920.—This small handbook is one of the Cambridge Public Health Series published under the editorship of G. S. GRAHAM-SMITH and J. E. PURVIS. It is intended to be a reference work for the medical profession and to instruct public health and hygienic committees; but it also includes several chapters involving certain physiological relations of the bacteria, and containing data not usually assembled in bacteriological handbooks.—*B. M. Duggar.*

604. SAUVAGEAU, CAMILLE. **Utilisation des algues marines.** [Utilization of marine algae.] 394 p., 26 fig. Librairie Octave Doin: Paris, 1920.—The fourth volume of the Encyclopédie Scientifique published under the direction of Dr. TOULOUSE has just appeared and deals in a comprehensive manner with the economic uses of sea weeds. After a general introduction on the marine algae, there is a full discussion of the kelps, including *Nereocystis*, *Macrocystis*, and *Alaria*, on the Pacific coast, together with the methods of harvesting this plant. The use of algae for fertilizers is treated in the second chapter and includes considerable valuable information as to the analysis and practical value of this material for agricultural purposes. The uses of the brown and red algae in various industries are treated at length and a short discussion of the making of paper from *Zostera* and *Posodonia* is included. There is a full summary of the information extant on the use and value of marine algae for food, and the work concludes with brief references to various other ways in which algae have been used, particularly in medicine. There are brief notes on the method of collecting and mounting algae for artistic effect, as well as some information on the cultivation of marine forms. A fairly complete bibliography on the entire subject is appended.—*George T. Moore.*

PROTOPLASM, MOTILITY

605. BAILEY, I. W. **The significance of the cambium in the study of certain physiological problems.** Jour. Gen. Physiol. 2: 519-533. 1920.—The author suggests that cambium cells furnish very desirable material for studies of certain problems such as the working sphere of the nucleus, the nucleocytoplasmic relation, the dynamics of karyokinesis, and cytokinesis. The cells are of 2 distinct types, small, nearly isodiametric cells, more or less similar to terminal meristem and embryo cells, and large, much elongated cells. The elongated cells can be induced to divide to form cells of the small type. Data are presented showing that there may be no very close relation between nuclear size, number or mass of chromosomes, and cell size.—*Otis F. Curtis.*

DIFFUSION, PERMEABILITY

606. LESAGE, PIERRE. **Expériences utilisables en physiologie végétale, sur l'osmose et sur l'aspiration due à l'évaporation.** [Experiments useful in plant physiology, on osmosis and gaseous exchange due to evaporation.] Compt. Rend. Acad. Sci. Paris 171: 358-360. 1920.—An experiment of Dutrochet was repeated using various liquids and a membrane of acetocellulose. It was found that this membrane, varying with its origin and manipulation, cannot always be depended upon to produce osmosis.—*C. H. Farr.*

607. LOEB, JACQUES. **The reversal of the sign of the charge of membranes by hydrogen ions.** Jour. Gen. Physiol. 2: 577-594. 1920.—The sign of the electrical charge on a collodion membrane treated with protein becomes positive when the hydrogen-ion concentration exceeds a certain limit. Evidence is presented showing that a film of protein adheres to the membrane, and that the hydrogen-ion concentration at which reversal of the sign of the charge on the membrane takes place, varies in the same sense as the isoelectric point of the protein used.—*Otis F. Curtis.*

608. RABER, ORAN L. **The antagonistic action of anions.** Jour. Gen. Physiol. 2: 541-544. 1920.—By the electrical conductivity method of OSTERHOUT in experiments with *Laminaria Agardhii* the author finds antagonism between anions of sodium acetate and sodium sulfate.—*L. Knudson.*

609. RABER, ORAN L. A quantitative study of the effect of anions on the permeability of plant cells. *Jour. Gen. Physiol.* 2: 535-539. 1920.—This is a contribution on the influence of anions on permeability as determined by the electrical conductivity method of OSTERHOFF. The sodium salts of sulfoeyanide, chloride, nitrate, acetate, tartrate, phosphate, and citrate were used individually in the first series of experiments in solutions of equal conductivity and in the second series at a concentration of 0.52 m. Comparing the resistance of *Laminaria Agardhii* after treatment with the individual salt solutions with the resistance of the control in sea water of the same conductivity, it was noted that citrate, phosphate, tartrate, and sulfate caused a marked decrease in resistance, while the bromide, sulfoeyanide, chloride, and nitrate were less effective.—L. Knudson.

MINERAL NUTRIENTS

610. CANALS, E. Dosage du calcium et du magnésium dans différents milieux salins. [The amounts of calcium and magnesium to be used in different culture media.] *Compt. Rend. Acad. Sci. Paris* 171: 516-518. 1920.—It is found that iron salts used in culture solutions precipitate some of the calcium and magnesium. In addition, the aluminium salts precipitate some of the magnesium. This precipitation is prevented by adding a few drops of an acid such as acetic.—C. H. Farr.

611. HOFFER, G. N., AND R. H. CARR. I. Iron accumulation and mobility in diseased corn stalks. [Abstract.] *Phytopath.* 10: 56. 1920.

612. HOFFER, G. N., AND R. H. CARR. II. Experiments to test effects of iron salts on corn plants. [Abstract.] *Phytopath.* 10: 57. 1920.

613. PFEIFFER, TH., A. RIPPEL, UND CH. PFOTENHAUER. Über den Verlauf der Nährstoffaufnahme und Stofferzeugung bei der Gerstenpflanze. [The course of plant food absorption and assimilation in the barley plant.] *Fühlings Landw. Zeitg.* 68: 81-101. *Fig. 1-8.* 1919.—Barley plants were planted April 3 on well fertilized land. Representative samples of the aerial parts were taken April 24, when the third leaf was forming, May 30, before heading, June 14, just headed, July 7, in the milk, and July 23 (fully ripe), and total dry matter, ash, organic matter, phosphoric acid, lime, magnesia, potash, nitrogen, and silica determined in each case. Separate determinations were made on the leaves, stems, and heads. The total dry matter increased up to harvest time. All substances in the grain were most abundant at harvest time except lime and potash, which reached maxima during the milk stage. Total ash increased up to the time of the milk stage. The ash content of the leaves and stems was highest respectively at heading time and during the milk stage. Total organic matter increased steadily to harvest time, being highest in the leaves at heading time and in the stems during the milk stage. Total phosphoric acid increased up to harvest time, being highest in the leaves before heading and in the stems at heading time. Total lime increased up to the milk stage, being highest in the leaves at heading time and in the stems during the milk stage. Total magnesia increased up to heading time, but the proportion in the stems reached its maximum during the milk stage. Total potash increased up to the milk stage, being highest in the leaves before heading. Total nitrogen increased up to harvest time, being highest in the leaves before heading and in the stems at heading time. Total silica increased up to harvest time, being highest in leaves and stems during the milk stage.—A. T. Wiancko.

PHOTOSYNTHESIS

614. COUPIN, HENRI. Sur les plantules qui verdissent à l'obscurité. [On seedlings which turn green in the dark.] *Compt. Rend. Acad. Sci. Paris* 170: 1071-1072. 1920.—A comparison of seedlings of pines grown in the light with those grown in darkness reveals a difference in the amount of chlorophyll and anthocyan in the cotyledons and hypocotyl. Very little morphological etiolation occurs in this species. Only one kind of chlorophyll develops in darkness.—C. H. Farr.

615. KÖGEL, P. R. Über die Photosynthese des Formaldehyds und des Zuckers. [On the photosynthesis of formaldehyde and sugar.] Biochem. Zeitschr. 95: 313-316. 1919.—A brief theoretical discussion. The author considers the possibilities of the action of light in effecting enol-keto transformations analogous to the formation of benzil-benzoin from benzil and H_2 in presence of light; the light performs the double function of benzoin formation and of effecting benzil-benzoin combination. Benzil reacting with H_2 results in stilbendiol, which by rearrangement gives benzoin. The latter is an enol-keto transformation. These reactions suggest to the author a theory of photosynthesis. Two molecules of CO_2 arranged as a simple polymer unite with 2 molecules H_2O to give tetrahydroxyethylene and O_2 . The former is an enol form, which by transformation to the keto form may result in 2 molecules of $HCOH$ and O_2 .—W. W. Bonns.

METABOLISM (GENERAL)

616. ANONYMOUS. [Rev. of: ARMSTRONG, E. F. The simple carbohydrates and glucosides. 3rd ed., x + 239 p. Longmans, Green & Co.: London, 1919.] Sci. Prog. [London] 14: 688-689. 1920.

617. ANONYMOUS. [Rev. of: FISHER, MARTIN H., AND MARION O. HOOKER. Fats and fatty degeneration: A physico-chemical study of emulsions and the normal and abnormal distribution of fat in protoplasm. ix + 155 p. John Wiley & Sons: New York, 1917.] Sci. Prog. [London] 14: 502. 1920.

618. ANONYMOUS. [Rev. of: SPOEHR, H. A. The carbohydrate economy of cacti. Carnegie Inst. Washington [D. C.] Publ. 287. 79 p., fig. 1-2. 1919.] Sci. Prog. [London] 14: 511-512. 1920.

619. BLAKE, J. C. The individuality of erythroextrin. Jour. Amer. Chem. Soc. 42: 2673-2678. 1920.

620. BOAS, F., UND H. LEBERLE. Untersuchungen über Säurebildung bei Pilsen und Hefen. III. [Studies of acid formation by fungi and yeasts.] Biochem. Zeitschr. 95: 170-178. 1919.—The authors have studied the selective action of *Aspergillus niger* when grown in solution combinations of dextrose-acetamid, dextrose-acetamid-ammonium sulphate, dextrose-ammonium sulphate, dextrose-glycocol, dextrose-glycocol-acetamid, dextrose-peptone, dextrose-peptone-ammonium sulphate, and dextrose-ammonium sulphate. The data submitted are P_H variations in the substrate, growth (weight of mat and conidia formation), and reaction to Nessler's reagent. The strength of solutions ranged from 0.5-0.25 per cent. In the series with dextrose, acetamid, and ammonium sulphate the P_H values obtained during a 7-day experiment indicate that acetamid in presence of ammonium sulphate is not autolyzed. Similar results were obtained in the dextrose-glycocol-acetamid series, and in the series where peptone, dextrose, and ammonium sulphate were used in different combinations. The several experiments indicate a consistent election of nitrogen from ammonium salts as against the organic solutions used. The increased P_H values resulting are held to account for the partial inhibition of conidial formation and the presence of soluble starch in the solutions. On the basis of the results the authors conclude that lipoid solubility (possessed by acetamid) is not a factor in the metabolism of the fungus, and that strongly dissociated nitrogen compounds are elected in preference to those weakly dissociated.—W. W. Bonns.

621. BOKORNY, T. Weitere Beiträge zur organischen Ernährung der grünen Pflanzen mit Ausblicken auf die Praxis. [Further consideration of organic nutrition of green plants with reference to practical usage.] Biochem. Zeitschr. 94: 78-83. 1919.—Potted plants, cabbage among others, treated for several weeks with solutions of glycerin, methyl alcohol, etc., showed favorable results. Cabbage treated with the alcohol resulted in growth indicated by 164 g. (40 g. dry weight) as against 74 g. (18 g. dry weight) control. Alcohol-treated rye developed

spikes in over 3½ months, and set fruit. The total weight obtained was 24 g. as against 11.2 g. for controls. Beans treated with 2 per cent methyl alcohol far surpassed controls in growth in 14 days. Cucurbit and carrot seedlings placed directly in alcohol solutions were injured. Cabbage treated with 0.25 per cent glycerin solution attained in 3 months a weight of 133.1 g. as compared with 74.4 g. for the control. The foregoing suggests as fertilizer the wastes from cellulose industries in which the sulphite process is employed, such waste containing a varying amount of sugar in addition to other organic constituents. Experiments with such material as fertilizer were conducted on plants in pots and in other containers. The addition of sulphite wastes are stated to have increased growth. Brief consideration is given to the possible fertilizing values of urine, urea, and urea compounds, with citations from other workers.—W. W. Bonns.

622. BOURQUELOT, EM. *Remarques sur la méthode biochimique de recherche des glucosides hydrolysables par l'émulsine à propos de la note de M. P. Delauney.* [The biochemical methods for research on the glucosides hydrolysable by emulsin.] *Compt. Rend. Acad. Sci. Paris* 171: 423-425. 1920.—Fourteen new glucosides of this type have been found in addition to the 8 known before 1902. Some of these have now been found in other plants. Out of 281 species examined 205 contained glucosides of this type.—C. H. Farr.

623. BOURQUELOT, EM., ET M. BRIDEL. *Recherche et caractérisation du glucose dans les végétaux par un procédé biochimique nouveau.* [Detection and identification of glucose in plants by a new biochemical process.] *Jour. Pharm. et Chimie* 22: 209-215. 1920.—The usual tests applied for detecting glucose in plants, that is, reduction of Fehling's solution, fermentation produced by means of yeast, or conversion into the osazone by means of phenylhydrazine, are not specific for this sugar, because other sugars, such as the aldohexoses, the aldopentoses, maltose, gentiobiose, cellobiose, and even glucosides, such as verbenalin, have reducing properties. Levulose, mannose, galactose, maltose, and saccharose can be fermented by beer yeast, levulose and mannose give the same osazone. When to an aqueous solution of a glucoside emulsin is added, the former is hydrolyzed, glucose is formed, and the solution becomes dextrorotatory. This reaction is reversible when carried out in an alcoholic medium, the glucose forming, for instance when methyl alcohol is used, a glucoside in the presence of emulsin, methyl glucoside, which is levorotatory. By applying this method, the authors succeeded in identifying glucose in juniper, *Loroglossum*, etc., which contain quite a number of other sugars in addition to glucose. For the details of the method the original should be consulted.—H. Engelhardt.

624. BOURQUELOT, EM., ET H. HÉRISSEY. *Essai de synthèse biochimique d'un mannobiose.* [Attempt to synthesize a mannobiose.] *Jour. Pharm. et Chimie* 21: 81-85. 1920.—The albuminoids of St. John's bread consist of mannan and galactan and are hydrolyzed by a ferment seminale. This ferment, which is also present in *Trigonella foenum graecum*, *Medicago sativa* and *Sarothamnus scoparius*, has been utilized to synthesize mannobiose. For this purpose a maceration of lucerne seeds was allowed to act on an aqueous solution of mannose in the presence of a small amount of toluene. The results were not quite conclusive, a new substance probably consisting of 2 molecules of mannobiose, which, however, could not be obtained in a pure state, appears to be formed.—H. Engelhardt.

625. BOURQUELOT, EM., ET H. HÉRISSEY. *Presence dans le Mélilot et l'Aspérule odorante de glucosides fournissant de la coumarine sous l'action hydrolysante de l'émulsine.* [The presence of glucosides in *Melilotus* and *Asperula odorata* furnishing coumarin by the hydrolyzing action of emulsin.] *Jour. Pharm. et Chimie* 22: 289-298. 1920.—*Melilotus* and wood-root contain a glucoside which is split up by emulsin into coumarin and *d*-glucose, but the investigations do not throw any light on the constitution of the glucoside, which may contain other constituents besides these 2. The emulsin is present in the plant itself and can be obtained in powdered form. It readily hydrolyzes amygdalin and salicin.—H. Engelhardt.

626. BRIDEL, M. Sur la présence simultanée du gentianose et du saccharose dans les espèces du genre *Gentiana*. [The presence of both gentianose and saccharose in gentian.] Jour. Pharm. et Chimie 21: 306-311. 1920.—The simultaneous presence of both gentianose and saccharose in *Gentiana lutea*, *G. asclepiades*, *G. punctata*, *G. cruciata*, and *G. purpurea* can be explained by the gentiobiase (the ferment in gentian) acting both hydrolytically and synthetically, forming from the gentiobiose first saccharose and then, during the subsequent development of the root, transforming this again into gentiobiose.—H. Engelhardt.

627. LAST, E. Über die quantitative Bestimmung von geringen Zuckermengen bei Gegenwart von höheren und niederen Eiweissabbauprodukten. [The quantitative determination of small amounts of sugar in the presence of complex and of simple decomposition products of proteins.] Biochem. Zeitschr. 93: 66-81. 1919.—The BERTRAND titration method was used and the following abstract of his conclusions exhibits his results as to the limitations of the method. Precipitation of protein decomposition products affecting quantitative sugar determination is effected by using 2 g. neutral HgCl_2 per g. of protein (albumose, peptone) present. Acid and excess of HgCl_2 are to be avoided. Precipitation with $\text{Hg}(\text{NO}_3)_2$ according to the PATEIN-DUFAU method is satisfactory when accurately done.—If ereptone is present, there is a factor of error ascribed to the atomic grouping in the molecule. This is due to solution of cuprous oxide by the ammonia set free, and occurs either with boiling in alkaline solution or on long standing. Neutral HgCl_2 also precipitates ereptone in the test solutions to a degree sufficiently complete to give accurate sugar values. Here also precipitation with $\text{Hg}(\text{NO}_3)_2$ is satisfactory.—W. W. Bonns.

628. LUMIÈRE, AUGUSTE. Les vitamines sont-elles nécessaires au développement des végétaux? [Are vitamines necessary to the development of plants?] Compt. Rend. Acad. Sci. Paris 171: 271-273. 1920.—Fungi were cultivated on purely mineral and organic nutrients without the addition of vitamines and developed equally as well as in the presence of vitamines. Experiments are referred to which attempt to determine the properties of vitamines, such as precipitation, filtration, etc.—C. H. Farr.

629. RICHTER-QUITTNER, M. Eine Mikromethode der Acetonbestimmung. [A micro-method of acetone determination.] Biochem. Zeitschr. 93: 163-171. Fig. 1-2. 1919.

630. SHERRARD, L. C., AND G. W. BLANCO. The acid hydrolysis of sugar cane fiber and cotton seed hulls. Jour. Indust. Eng. Chem. 12: 1160-1162. 1920.—Of the total sugars produced by the acid hydrolysis of these materials, only a small quantity is fermentable, the larger portion being of the pentose variety.—Henry Schmitz.

631. TUNMANN, O. Über die Alkaloide bei Verwundungen der Pflanzen. [Alkaloids in relation to wounding of plants.] Biochem. Zeitschr. 95: 164-169. 1919.—The author has checked the work of TROEGELE, using *Atropa Belladonna* and *Pilocarpus pinnatifolius*. His conclusions, based upon quantitative and microchemical data obtained from these plants when subjected to traumatism and to snail depredations, are that such injuries do not result in increased alkaloidal content.—W. W. Bonns.

632. WISELL, VON. Ueber die chemische Bestimmung der Stärke in verschiedenen Reisigarten und einigen anderen Pflanzenstoffen. [The chemical determination of starch in various kinds of prunings and other plant materials.] Landw. Jahrb. 53: 618-625. 1919.—The author describes in detail 2 methods for determining chemically the quantity of starch in plant materials and concludes that the method of EWERS, involving extraction with hot weak hydrochloric acid without pressure, gives more dependable results than that of REINKE involving the use of high pressures.—A. J. Pieters.

633. ZIJP, C. VAN. Over de mogelijkheid van het ontstaan van Hexamethyleentetramine in assimilerende planten end eene microchemische reactie op ammoniumzouten. [The possibility of the production of hexamethylenetetramine in assimilating plants and a microchemical

reaction of ammonium salts.] Pharm. Weekblad 57: 1345-1348. 1 fig. 1920.—The author believes that contrary to the statement of O. Loew "that in the presence of formaldehyde and of an ammonium salt no hexamethylenetetramine is formed in the living protoplasm" this product is formed, because he found by microchemical experiments that not only ammonia but also ammonium salts form hexamethylenetetramine. The test was made with iodine-potassium iodide solution by which characteristic microscopic crystals are produced.—*H. Engelhardt.*

METABOLISM (NITROGEN RELATIONS)

634. AUBEL, E. Influence de la nature de l'aliment carboné sur l'utilisation de l'azote par le *Bacillus subtilis*. [The influence of the carbon nutrients on the utilization of nitrogen by *Bacillus subtilis*.] Compt. Rend. Acad. Sci. Paris 171: 478-480. 1920.—More nitrogen is absorbed when this organism is grown on glycerine than when on glucose or levulose.—*C. H. Farr.*

635. BOS, E. C. VAN DEN. Action stimulante des sels azotés sur la germination de l'*Amarantus caudatus*. [Stimulation of germination in *Amarantus caudatus* by nitrogen-containing salts.] Recueil Trav. Bot. Neerland. 17: 69-120. 1920.—At a temperature of 15-16°C. the seeds germinate only in darkness. When the maximum temperature is almost reached, they germinate at 43-45°C. in the light only, though the seedlings never attain their full development.—In a Knop solution the germination was found to be more rapid, which suggested the action of nitrogen. A solution of 0.1 m. KNO_3 had an unfavorable influence, while 0.001 m. KNO_3 was more favorable. In some salts NO_3 proved to be stimulating whereas Cl and SO_4 -ions were not.—Solutions of KSCN of 0.4 m. gave a maximum germination of 80 per cent. Such compounds as asparagin and urea did not stimulate germination.—*J. C. Th. Uphof.*

636. LEWIS, W. C. McC. [Rev. of: ROBERTSON, T. BRAILSFORD. The physical chemistry of the proteins. xv + 483 p. Longmans, Green & Co.: New York, 1918.] Sci. Prog. [London] 14: 502-503. 1920.

637. LÜERS, H. Über die Identität von Hordein und Bynin. [The identity of hordein and bynin.] Biochem. Zeitschr. 96: 117-132. 1919.—Hordein of barley and bynin of malt were hydrolyzed according to the methods of VAN SLYKE to determine the relationships of these products. The author's analyses lead him to conclude that bynin is not a new protein differing from hordein in its properties, as OSBORNE believes, but that it is more likely a residuum.—*W. W. Bonns.*

638. PHEILER, W., UND F. ENGELHARDT. Ueber den Nachweis von Rizin in Füttermitteln mit Hilfe der serologischen (Präzipitations—Komplementablenkings und Konglutinations) Methoden sowie der Hämagglutination. [The identification of ricin in feedstuffs by means of serological methods, as well as the haemagglutination method.] Landw. Jahrb. 35: 561-583. 1919.—The author has investigated especially the method recommended by MIESSNER and REWALD and condemned as not specific by BIERBAUM. The author finds that the method is highly specific, when a proper antiserum is used. Investigations on the other methods are reported but the author concludes that properly used the precipitation method is specific and convenient.—*A. J. Pieters.*

639. ROUSSEAU, EUG., ET SIROT. Les matières azotées et l'acide phosphorique dans la maturation et la germination du blé. [The nitrogen compounds and phosphoric acid during the ripening and germination of wheat.] Compt. Rend. Acad. Sci. Paris 171: 578-580. 1920.—During the ripening of wheat the proportion of nitrogen to phosphoric acid, P_2O_5 , remains about constant. Both decrease until early July, whereafter they increase to some extent. Acidity is found to maintain a considerable decrease until the last of July.—*C. H. Farr.*

640. SERTZ, H. Über die Veränderung der Stickstoffformen in keimender Lupine, insbesondere über das Verhältnis von formoltitrierbarem und Formalinstickstoff zum Gesamtstick-

stoff. [The nitrogen changes in germinating lupines with special reference to the relation of formol-titratable and of formalin nitrogen to total nitrogen content.] *Biochem. Zeitschr.* 93: 253-254. 1919.—A brief note on the SØRENSEN formol titration method, showing that in the presence of neutral aqueous formaldehyde solution, plant albumins, albuminates, and hemi-albumoses are practically insoluble, while formalin nitrogen, peptone, diastase, etc., remain soluble. Progressive germination gave increased values of formol-titratable nitrogen (soluble amino acids), and a corresponding falling off in formalin nitrogen (insoluble protein). The sum of the values obtained approximates the total nitrogen content.—*W. W. Bonns.*

METABOLISM (ENZYMES, FERMENTATION)

641. BOKORNY, T. *Bindung des Formaldehyds durch Enzyme.* [Formaldehyde fixation by enzymes.] *Biochem. Zeitschr.* 94: 69-77. 1919.—Reviewing briefly some results of NEUBERG showing variation in inhibitory effects of different concentrations of formaldehyde on various enzymes, and in the effects of the same concentration on different enzymes, Bokorny accounts for these on the theory of differences in molecular structure of enzymes, with corresponding difference in chemical reactions with formaldehyde. Quantitative data are presented showing the effect of formaldehyde on emulsin, based upon the formation of hexamethylenetetramine when formaldehyde reacts with ammonia, $6 \text{ HCOH} + 4 \text{ NH}_3 = 6 \text{ H}_2\text{O} + \text{C}_6\text{H}_{12}\text{N}_4$. Any excess ammonia is titrated against sulphuric acid. Treating 1 g. emulsin with 50 cc. 0.925 per cent formaldehyde for 3 days showed a formaldehyde combination of 11-38 per cent of the dry weight of the enzyme. The results cited are followed by the author's views on the protein nature of the enzyme, as indicated by its amphoteric properties, combination with acids, bases, etc.—*W. W. Bonns.*

642. BOURQUELOT, EM., M. BRIDEL, ET A. AUBRY. *Synthèse biochimique du cellobiose a l'aide de l'émulsine.* [Biochemical synthesis of cellobiose by means of emulsin.] *Jour. Pharm. et Chimie* 21: 129-132. 1920.—Cellobiose or cellose is a glucobiose and is isomeric with gentiobiose and maltose. The authors succeeded in synthesizing this sugar by allowing emulsin to act on a 50 per cent aqueous solution of glucose. The formation is probably due to the fact that emulsin does not appear to be a uniform ferment but to be composed of gentiobiase, cellobiase, and beta-glucosidase.—*H. Engelhardt.*

643. BRIDEL, M. *Sur la résistance des ferments de l'émulsine à l'action prolongée de l'alcool méthylique à 70 p. 100.* [The resistance of emulsin toward the prolonged action of 70 per cent methyl alcohol.] *Jour. Pharm. et Chimie* 22: 323-327. 1920.—Seventy per cent methyl alcohol did not destroy the fermentative power of emulsin on beta-glucosides, lactose, and beta-ethyl-galactoside within 5 years. The strength, however, had been considerably reduced. The ferments acting on lactose and beta-ethyl-galactoside appear to be more resistant than beta-glucosidase.—*H. Engelhardt.*

644. FALK, K. G. *The chemistry of enzyme actions.* Amer. Chem. Soc. Monogr. Ser. 136 p. Chemical Catalog Co.: New York, 1921.—This constitutes the first of a series of monographs proposed by the American Chemical Society. These monographs are designed to serve two purposes, (1) to present in readable form for those who may not be specialists in the particular field the knowledge available on the selected topic, and (2) through a well digested survey of the present status of the problem to promote and facilitate research. The author is convinced that enzyme studies make contributions not merely to the "chemical phenomena underlying living matter" but also to "a better understanding of the fundamental chemical relations underlying an exact knowledge of chemical reactions."—He recognizes 2 methods of attack, briefly, (1) enzymes as catalysts, modifying reaction velocities (the kinetics of enzyme action), and (2) the chemical nature of enzymes and their reactions. He purposes to indicate the progress attained by these 2 methods, and proceeds to develop the subject under the following captions: Velocities of chemical reactions; general theory of chemical reactions, catalysis; chemical reactions catalyzed by enzymes; physical properties common to enzyme preparations; chemical properties common to enzyme preparations; chemical

nature of certain enzymes; mechanism of enzyme actions; uses and applications of enzymes; and the present status of the enzyme problem.—It is recognized by the author that the subject matter may not be presented in a completely rounded and final form; but it is intended to be adequately comprehensive, and to a large degree supplementary to existing works, emphasizing particularly in how far enzyme reactions may be, or have been shown to be, analogous to other chemical changes. The literature of recent work is freely cited.—*B. M. Duggar.*

645. JACOBY, M. Über Bakterien-Katalase. III. [Bacterialcatalase. III.] Biochem. Zeitschr. 95: 124-130. 1919.

646. KOCH, A., UND A. OELSNER. Über die Betainspaltung durch die Bakterien des Melasseschlempedüngers "Guanol." [The bacterial splitting of betain in the molasses-waste fertilizer Guanol.] Biochem. Zeitschr. 94: 139-162. 1919.—The authors have studied the organisms concerned with the splitting of betain in a commercial "Guanol" fertilizer produced from molasses waste. These comprised various forms to be found in compost,—mold organisms forming trimethylamine and a bacterium which the authors designate as *Betainobacter* α . The latter was studied in some detail and was found to split off all the nitrogen of the betain molecule as NH_3 , using for itself only a small portion. Methyl alcohol, formic acid, and acetic acid were noted as intermediate disintegration products.—*W. W. Bonns.*

647. NĚMEC, A. Über die Verbreitung der Glycerophosphatase in den Samenorganismen. [The distribution of glycerophosphatase in seeds.] Biochem. Zeitschr. 93: 95-100. 1919.—The author has determined the presence of the enzyme in the seeds of 20 species, using the method of NEUBERG and KARZAG. The substrate used was a 1 per cent solution of sodium glycerophosphate (Merck), the total P_2O_5 being determined, and macerated seed material was allowed to act upon the phosphate solution under controlled conditions. Results are given in P_2O_5 split off. The necessary controls were determined. The values given in the author's table show that of the seeds used the cereals possess the least hydrolytic activity. Legumes show high enzyme content, differing considerably with the species. Plants of *Lens* and *Pisum* were more active than those of *Lupinus* and *Vicia*. The crucifers (*Brassica*, *Raphanus*, and *Sinapsis*) are especially rich in the enzyme, the latter splitting off more than 41 per cent P_2O_5 . The maximum activity was observed in the soy bean, which hydrolyzed almost 50 per cent of the glycerophosphate supplied. In general, seeds rich in oil are higher in enzyme activity of the kind here studied than the albuminous seeds, and the latter in turn have greater hydrolytic power than starchy seeds.—The fact that the P_2O_5 set free in no case exceeded 50 per cent of the amount present in the substrate leads the author to the belief that the enzyme present acts only on the naturally occurring *d*-glycerophosphoric acid. Thermolability of the enzyme at 100°C . was established.—*W. W. Bonns.*

648. NORTHROP, JOHN H. The influence of hydrogen ion concentration on the inactivation of pepsin solutions. Jour. Gen. Physiol. 2: 465-470. 1920.—Pepsin in solution at 38°C . was found to be most stable at a hydrogen-ion concentration of P_H 5.0. An increase above this point resulted in a slow increase in the rate of destruction of the pepsin, while a decrease resulted in a rapid increase in the rate of destruction. Neither the impurity of the enzyme, nor the anion of the acid affected appreciably the rate of destruction. There seemed to be no relation between optimum range of hydrogen-ion concentration for digestion and the destruction of the enzyme.—*Otis F. Curtis.*

649. NORTHROP, JOHN H. The effect of the concentration of enzyme on the rate of digestion of proteins by pepsin. Jour. Gen. Physiol. 2: 471-498. 1920.—The rate of protein digestion is not always proportional to the total concentration of pepsin. It is suggested that this may be due to inactivation of some of the enzyme by combination with some product of the reaction, perhaps peptone, and that this inactivation is quantitatively expressed by the law of mass action. The rate of reaction is, therefore, proportional to the quantity of active

enzyme, not total enzyme. The hypothesis has been put in the form of a differential equation and found to agree quantitatively with the experimental results when the concentration of pepsin, peptone, or both is varied. An integral equation is obtained which holds for the entire course of digestion with varying enzyme concentration. Many analogies between the action of pepsin on albumen and the action of toxins on organisms are pointed out.—*Otis F. Curtis*.

650. STAEHELIN, M. Die Rolle der Oxalsäure in der Pflanze. Enzymatischer Abbau des Oxalations. [The rôle of oxalic acid in plants. The splitting off of the oxalate ion by enzyme action.] *Biochem. Zeitschr.* 96: 1-49. 1919.—This is a detailed study of the enzyme in various plants capable of hydrolyzing oxalic compounds. A brief review of previous work dealing with acid metabolism of succulents is presented. The author sets out to determine the following points: (1) The distribution of the enzyme in different types of plants, that is, in nonsucculents and succulents of widely differing genera, (2) determination of an oxalate enzyme in acid-free plants, (3) distribution of the enzyme in the plant tissues, and (4) the kinetics of the reaction.—The objects studied covered chlorophyllous cryptogams and phanerogams, both in green and etiolated stages. In general the experimental methods comprised the incubation of the enzyme-containing plant powder with a solution of an oxalic acid salt, preferably ammonium oxalate. At the close of the experiment the residual oxalate was quantitatively determined. CO_2 determinations were made with standard Pettenkoffer and titration methods.—The chief results are as follows: Green leaves, stems, roots, etiolated organs, and chlorophyll-free seeds of all plants studied contained an oxalate-hydrolyzing enzyme. The pressed out juice as well as the powder precipitated by alcohol, possessed enzyme activity (*Helianthus* leaves). This action is greatest between 30 and 40°C., and is in large measure dependent upon oxygen supply. It is completely inhibited in an atmosphere of hydrogen. Increased oxalate concentration is correlated with a relative decrease in hydrolysis, hydrolysis increasing with the square root of the enzyme increase (rule of SCHÜTZ). With a preparation of *Rumex* leaves, enzyme action conforms to a mono-molecular equation, while with a powder from *Helianthus* leaves there is a deviation from the law of auto-catalysis. The enzyme is an oxidase, and appears to have the properties of a carboxylase. The oxalate ion is not completely oxidized by the enzyme to CO_2 (doubtful in case of *Pisum*). Other disintegration products were not determined.—*W. W. Bonns*.

651. WOHLGEMUTH, J. Über neue Theorien der Diastasebildung und Diastasewirkung. [On new theories of diastase formation and action.] *Biochem. Zeitschr.* 95: 212-224. 1919.—A discussion of the work of G. WOCHER, supplemented by a brief account of experiments, opposing the conclusions of Woche that formaldehyde exerts an enzyme-like action on starch, similar to diastase action.—*W. W. Bonns*.

METABOLISM (RESPIRATION)

652. CERIGHELLI, RAOUL. Sur les échanges gazeux de la racine avec l'atmosphère. [The gaseous exchange between roots and atmosphere.] *Compt. Rend. Acad. Sci. Paris* 171: 575-578. 1920.—A study of attached and detached roots in which the oxygen intact and the carbon dioxide liberation was determined. The $\frac{\text{CO}_2}{\text{O}_2}$ ratio has a value varying from 0.7 to 1.0 according to the species. Respiration is higher in free humid air than in confined or dry atmosphere. In the case of a confined atmosphere such as occurs normally in the soil the CO_2 is retained in the tissues. In dry open air the ratio however is the same as in free humid air although the amount of gases exchanged is decreased.—*C. H. Farr*.

653. LANGDON, S. C., AND W. R. GAILEY. Carbon monoxide a respiration product. *Sci. Amer. Monthly* 1: 508-510. 3 fig. 1920. [Reprinted from *Jour. Amer. Chem. Soc.*, 42: 641-646. 1920.]—The existence of several per cent of carbon monoxide gas in the pneumatocyst (i.e., floater) of the giant Pacific Coast kelp, *Nereocystis luetkeana*, is confirmed. It is concluded that this is formed as a product of respiration rather than as an intermediate step in photosynthesis.—*Chas. H. Otis*.

654. HERZFELD, E., UND R. KLINGER. *Chemische Studien zur Physiologie und Pathologie VI. Zur Biochemie der Oxydationen.* (Zellatmung; Oxydations-fermente; zur Theorie der Narkose.) [Chemical studies in physiology and pathology VI. The biochemistry of oxidation. (Respiration; oxidases; narcosis).] *Biochem. Zeitschr.* 93: 324-352. 1919.—This is a critical discussion based upon the work of others. The author stresses the possibility that certain molecular structures may weaken the union of the O atoms in the oxygen molecule so that "activation" (increased oxidizing power) results, whereby loose chemical combinations are made with H_2O or with metals with peroxide-like structure, with OH ions, and with O_2 -adsorbing surfaces. Such organic compounds as the lower fatty acids or their salts might be oxidized to CO_2 and H_2O , fulfilling the conditions for oxidation processes in the living organism, namely, active O_2 and easily oxidizable simpler metabolic products, rendering the assumption of certain oxidases unnecessary.—It is stated that 'Narcosis depends upon the disturbance of the formation or the adjustment of differences in physiological potential upon which the activity of the nervous system rests. Widely different compounds can effect this, depending upon a loose combination (adsorption) with the nerve substance. Certain narcotics (CO_2 , N_2O) act by means of acid accumulation in the tissues. This may be the mode of action of the lipid-soluble narcotics, correlated with an inhibition of oxidative processes. Neither for the latter group nor for narcotics in general is the inhibition of oxidation the sole or the most probable controlling factor of action.'—W. W. Bonns.

ORGANISM AS A WHOLE

655. REED, H. S. Conditions affecting the potentiality of the seed. [Rev. of: KIDD, F., and C. WEST. *Physiological predetermination: the influence of the physiological condition of the seed upon the course of subsequent growth and upon the yield.* *Ann. Appl. Biol.* 5: 1-10, 112-142, 157-170, 220-251. 1918-1919; 6: 1-26. 1919.] *Plant World* 22: 363-364. 1919.—Various questions indicated by the title are "discussed in a spirit which cannot fail to be stimulating to all further work in this important field."—C. H. Shull.

656. STILES, W. *Plant physiology.* *Sci. Prog.* [London] 14: 392-396. 1920.—A brief review of some of the more recent papers dealing with the effect of light, temperature, and humidity on the development of plants.—J. L. Weimer.

GROWTH, DEVELOPMENT, REPRODUCTION

657. CHURCH, MARGARET B. *Root contraction.* *Plant World* 22: 337-340. 1 fig. 1919.—A general review of literature on root contraction is given, and the facts summarized as follows: Roots do shorten; the parenchyma tissue of the root is the active tissue; cork and vascular traces are passive; the cork is crushed by contraction ultimately; there is a region where wrinkling and shortening both occur, another where shortening but no wrinkling is visible, and an unchanged region; dicotyledons show distorted bundle traces, while monocotyledons have bundles that remain straight during contraction. The author suggests the desirability of study of serial sections coupled with consideration of turgor changes and biochemical alteration of the protoplast and cell walls.—Charles A. Shull.

658. JONES, W. NEILSON. *A simple root auxanometer.* *Ann. Bot.* 34: 555-557. 1 fig. 1920.—The apparatus consists of a cylindrical glass jar provided with a stopper in which slides a glass rod. The root of a seedling impaled on a pin also sliding through the stopper, is adjusted to touch exactly the surface of water partly filling the jar, and the height of the rod, which dips into the water, is noted. After an interval the water is lowered and the tip readjusted by withdrawal of the rod, the amount of which withdrawal divided by the ratio of the cross section of jar to rod gives the growth in that interval. The exactness with which the contact of a tip with a water surface can be seen, and the great difference possible in the cross sections of rod and jar, render the apparatus very sensitive in principle. Suggestions are added for more exact calibration and compensation of evaporation.—W. F. Ganong.

659. KUIPER, K., JR. Koolsuurbemesting nachtverlichting en andere groeibevorderende factoren in de plantenteelt. [Effects of carbon dioxide manuring, night illumination, and other growth-stimulating factors upon plant culture.] *Cultura* 32: 332-344, 355-368. 1920.—A general review is given of experiments on the above subjects done by various investigators. The bibliography comprises 41 titles.—*J. C. Th. Uphof*.

660. REED, H. S. The nature of the growth rate. *Jour. Gen. Physiol.* 2: 545-561. 1920.—This paper is concerned with the application of the equation of an autocatalytic reaction to the growth of shoots of 3 year old pears (*Pyrus communis*), seedlings of *Juglans nigra*, and scions of *Juglans regia* grafted on *Juglans nigra*. The equation is applied also to data obtained by KREUSLER on growth of maize as well as to data presented by ECKLES and SWETT on the growth of Jersey heifers. The author finds a correspondence between the growth rate and rate of an autocatalytic reaction, and considers that the growth of an organism may be considered as a chemical reaction and that the growth rate for any moment is proportional to the growth yet to be made.—*L. Knudson*.

661. SAITO, KENDO. Über die chemischen Bedingungen der Askenbildung bei *Zygosaccharomyces major* Takahashi et Yukawa. [Chemical conditions for ascus formation in *Zygosaccharomyces major*.] *Bot. Mag. Tôkyô* 32: 1-13, 15-25. 1918.—It has been previously shown that *Zygosaccharomyces* forms no spores when grown on the usual gypsum blocks; but it has also been determined that on "soja bean sauce" with NaCl content of 5 per cent, and suitable temperature, abundant asci with spores are produced in 5-12 days. The author now shows that well nourished cultures produce a fine yield of asci and spores in 2-4 days on gypsum blocks moistened with 0.5 dextrose and 4-10 per cent NaCl. Testing 73 substances, including primarily inorganic and organic salts, carbohydrates, and certain amino acids, it is found that many inorganic and some organic salts used in concentrations of 0.5-1.5 m., in conjunction with 0.5 per cent dextrose, produce the same action; but in general non-electrolytes are of no value, or of slight comparative value. Many neutral salts of metals were, of course, toxic, and alkaline and acid salts often so in consequence of the reactions.—The addition of relatively little acid or alkali to the NaCl-dextrose cultures causes inhibition of the process, likewise all ammonium salts are inhibitory. Combinations of nutrient salts are entirely favorable. In part at least the morphogenic stimulus in ascus formation is the nutrient relation of the surrounding medium.—*B. M. Duggar*.

MOVEMENTS OF GROWTH AND TURGOR CHANGES

662. BOSE, J. C. Researches on growth of plants. I, II. *Nature* 105: 615-617, 648-651. *Fig. 1-6*. 1920.—The author discusses tropic movements in general, especially geotropism and heliotropism.—*O. A. Stevens*.

663. RICOME, H. Action de la pesanteur sur les végétaux. [The effect of weight on plants.] *Compt. Rend. Acad. Sci. Paris* 171: 261-263. 1920.—It is suggested that negative geotropism may be due to the weight of the terminal portion of the plant causing a compression below which stimulates growth and a tension above which retards it. This condition is indicated by the longitudinal splitting of geotropically stimulated stems. It is thus concluded that the plant exhibits a perception of weight.—*C. H. Farr*.

664. SPRUIT, C. The influence of electrolytes on the tactical movements of *Chlamydomonas variabilis* Dangeard. *Recueil Trav. Bot. Néerland.* 17: 129-204. *Fig. 1-7*. 1920.—Colloid chemical representations can be made of the influence of chemotactic agents. With *Chlamydomonas variabilis* there was observed a clear positive geotaxy, whereas other investigators have found *C. pulvisculus* to be negatively geotactic. Reaction to gravity ceases after adding to the water small quantities of acid, base, or salt. The susceptibility to light, like that to gravity, is diminished under the influence of added electrolytes. Besides a negative phototactic reaction a positive reaction may also occur. Thigmotactic response is manifest only in solutions which are not distinctly alkaline.—It was possible to produce an oxygen-line in the dark under a cover glass. By means of *Spirillum* sp. it was shown that under the

influence of carbonic acid a removal of the oxygen-line was effected. It was found possible to calculate the critical concentration where theoretically the transition of quick to slow movement took place. Motility was judged by means of the reaction to gravity.—On account of the great influence of H ions and OH ions the solutions were regularly changed. The solutions were used in a graded series, in each of which the H-ion concentration was constant. Salt solutions with gradations in H-ion concentrations were obtained by adding small quantities of acid or base. With acetate solutions, the fluids were made acid with acetic acid; in this case "buffer solutions" were obtained, which offered special advantages. The H ions and the OH ions have much influence on the movements of *Chlamydomonas*. Mixtures of sodium acetate with acetic acid and with potassium hydroxide in which the amount of acetate was constant were used. For KCl an important change of sensibility was observed, while with K_2SO_4 and KNO_3 the differences were insignificant.—The isoelectric point of the plasma colloids was calculated to be in weakly alkaline solutions. Two phenomena which might give further information about the place of the isoelectric point were the sticking of the organisms to the glass and also the sticking together of the algae by means of their cilia. The first phenomenon took place in solutions more acid than the isoelectric point of the plasma colloids, a fact attributed to the negative charge on the glass in alkaline, neutral, and very weakly acid solutions. Under the influence of light or of gravity the cilia of these algae came continually into contact with the glass, thus making it possible to acquire or lose an electrical charge. It was pointed out that the acid optimum of *Chlamydomonas* in chemotactic experiments is probably an acid optimum only under the influence of the glass.—*J. C. Th. Uphof.*

GERMINATION, RENEWAL OF ACTIVITY

665. COUPIN, HENRI. Sur la résistance de plantules à l'inanition. [On the resistance of seedlings to starvation.] Compt. Rend. Acad. Sci. Paris 171: 550-551. 1920.—Seedlings of 17 types of plants were left in the dark chamber after germination and the period elapsing before death occurred was noted. The species which lasted longest was the piñon pine, which did not die until after 60 days. The plants which succumbed first were those of alfalfa, which died in 15 days.—*C. H. Farr.*

666. NOBBE, F. Untersuchungen über den Quellprozess der Samen von *Trifolium pratense* und einiger anderer Schmetterlingsblütler. [Investigations regarding the swelling process in the germination of seeds of *Trifolium pratense* and other papilionaceous plants.] Landw. Versuchssta. 94: 197-218. 1919.—The capacity of clover seed to swell and germinate, over a period of forty years, is shown. Data are presented showing the effect of the climate under which the seeds are produced, the color, and size on the swelling capacity. The germination of the seeds of some wild papilionaceous plants can be largely increased by vigorous rubbing with sand. The action of alternate swelling and drying as well as the significance of the seed coat in germination is discussed.—*G. M. Armstrong.*

667. JÖRGENSEN, I., AND W. STILES. Some scientific aspects of cold storage. Sci. Prog. [London] 14: 427-434. 1920.—A consideration of the effect of slow and rapid freezing and thawing upon the water content of certain plant and animal tissues.—*J. L. Weimer.*

668. WEISS, H. The heat resistance of spores with special reference to the spores of *B. botulinus*. Jour. Infect. Diseases 28: 70-92. 1921.—The free spores of *B. botulinus* are destroyed within 5 hours at 100°, within 40 minutes at 105°, and within 6 minutes at 120°C., the thermal death point being determined under optimum conditions for survival. The destruction of the spores is a gradual process, probably due to a gradual protein coagulation, the spores being injured before they are killed, as inferred from the fact that the longer the period of heating before the spores are killed, the longer the period required for those spores to germinate. Young moist spores have a higher thermal resistance than old moist spores. The hydrogen-ion and hydroxyl-ion concentrations as well as sodium chloride considerably lower the thermal resistance, the lowering increasing with the increase in concentration of the ions or of the salt.—*Selman A. Waksman.*

TOXIC AGENTS

669. BERCEZELLER, L. Über Adsorption und Adsorptionsverbindungen V. Die Adsorptionsverbindungen des Kupferhydroxyds. [Adsorption and adsorption compounds V. The adsorption compounds of copper hydroxide.] *Biochem. Zeitschr.* 93: 230-236. 1919.

670. GUÉRITHAULT, B. Sur la présence du cuivre dans les plantes et particulièrement dans les matières alimentaires d'origine végétale. [On the presence of copper in plants and especially in foods of vegetable origin.] *Compt. Rend. Acad. Sci. Paris* 171: 196-198. 1920.—A description of the methods used in the determination of the amount of copper in plant tissues. Analyses of 44 types of plants are given in which the amount of copper in the ash varied from 63.6 per cent in sweet almond to 8.7 per cent in radish.—*C. H. Farr.*

671. MAQUENNE, L., ET E. DEMOUSSY. Sur la toxicité du fer et les propriétés antitoxiques du cuivre vis-à-vis des sels ferreux. [On the toxicity of iron and the antitoxic properties of copper in the presence of ferrous salts.] *Compt. Rend. Acad. Sci. Paris* 171: 218-222. 1920.—Iron salts in culture solutions are often altered into salts which are precipitated and which in themselves are not toxic, but give rise to a toxic acid. Peas grown in a culture medium in which iron and CaSO_4 were present showed the maximum growth. Growth decreases as the iron content is increased. A considerable growth occurs if KH_2PO_4 and CaSO_4 are both present. Ferrous salts are found to be always injurious, whereas ferric salts stimulate growth if used in small amounts. Iron alum and ferric oxide retard growth in all parts of the plant except in the stem, which is slightly stimulated.—*C. H. Farr.*

672. TRAUBE, J., UND H. ROSENSTEIN. Über die Wirkung von oberflächenaktiven Stoffen auf Pflanzensamen. [The action on seeds of compounds affecting surface tension.] *Biochem. Zeitschr.* 95: 85-100. 1919.—Seeds of cereals after preliminary water imbibition were subjected to the various organic compounds known to modify surface tension. In the case of volatile agents the seeds were exposed to the vapors; otherwise they were placed in the liquid. The results were noted in terms of per cent of germination and amount of growth.—In general the work of earlier investigators is confirmed, that is, a variation from stimulation to inhibition is correlated with increase in time of exposure to the agent. Narcotics, such as chloroform, ethyl ether, urethane, etc., showed a range of action conforming, over a series, to their effect as animal narcotics. With respect to germination and growth processes the phenomena of reversibility and irreversibility of narcosis as well as of stimulation were established.—Similar data were obtained for a series of disinfectants, such as cresol and naphthalene. The higher fatty acids, caproic and caprylic, were strongly stimulative to germination when applied in small doses.—*W. W. Bonns.*

673. WIENTJES, K. Accélération de la germination sous l'influence des acides. [Influence of acids upon germination.] *Recueil Trav. Bot. Néerland.* 17: 33-68. 1920.—The influence of HCl , H_2SO_4 , oxalic acid, and tartaric acid upon the germination of seeds of *Phacelia tanacetifolia*, *Solanum Lycopersicum*, *Alisma Plantago*, *Epilobium hirsutum*, and *Lythrum Salicaria* was determined.—There was no influence on *Phacelia*, *Alisma*, *Epilobium*, and *Lythrum*, but with *Solanum* some acceleration of germination was observed.—*J. C. Th. Uphof.*

ELECTRICITY AND MECHANICAL AGENTS

674. ANONYMOUS. Difference of potential in biology. *Sci. Amer. Monthly* 2: 122. 1920.—An account of a report presented to the Société de Biologie, Paris, March 13, 1920. It concerns experiments on the electric phenomena associated with certain physiological processes of plants and animals.—*Chas. H. Otis.*

SOIL SCIENCE

J. J. SKINNER, *Editor*F. M. SCHERTZ, *Assistant Editor*

(See also in this issue Entries 9, 13, 14, 20, 24, 25, 28, 34, 92, 93, 97, 108, 557, 604)

675. ANONYMOUS. **Fertilizers and parasitocides.** [Rev. of: COLLINS, S. H. *Chemical fertilizers and parasitocides.* xii + 273 p. Baillière, Tindall, and Cox: London, 1920.] *Nature* 106: 206-207. 1920.—Review refers to fertilizers only.—O. A. Stevens.

676. BEALS, COLONZO C. **Soil survey of Cass County, Indiana.** *Proc. Indiana Acad. Sci.* 1918: 186-204. 1920.—The upland soils are of the Clyde, Miami, and Dunkirk type. Muck also is present. The principal crops are corn, wheat, oats, clover, timothy, and potatoes. The paper is largely descriptive.—F. M. Schertz.

677. CARR, R. H., AND LEROY HOFFMAN. **The relation of nitrogen, phosphorus and organic matter to corn yield in Elkhart County, Indiana.** *Proc. Indiana Acad. Sci.* 1918: 160-165. *Soil map.* 1920.—About 50 per cent of the soils of this county are of the Miami loam and Miami sandy loam types and about 27 per cent are of the Plainfield sandy loam type. These soils are low in organic matter and 51 per cent are acid. Crop yield bears a close relation to the organic matter present and this in turn is closely associated with the amounts of nitrogen and phosphoric acid present. Three samples show that good crops are not always obtained from soil with the requisite plant food content. The difference in yield between the 0.2 per cent and the 8-10 per cent organic matter in soils averages 25.6 bushels. In average field conditions for each increase of 2672 lbs. of organic matter, 71.6 lbs. of nitrogen, and 35.7 lbs. of phosphoric acid per acre (2,000,000 lbs.) there is an increase of 1 bushel of corn.—F. M. Schertz.

678. CARR, R. H., AND V. R. PHARES. **Analyses of one hundred soils in Allen County, Indiana.** *Proc. Indiana Acad. Sci.* 1918: 151-159. *Soil map, pl. 1-3.* 1920.—The soils are of glacial origin, 70 per cent belonging to the Miami series and 18.5 per cent to the Clyde series. Determinations of the volatile organic matter, phosphoric acid, and nitrogen were made. In organic matter, 11 per cent of the soils had less than 4 per cent; 45 per cent of the soils ranged from 4 to 7 per cent; 37 per cent from 7 to 15 per cent; and 6 per cent were above 15 per cent. Each per cent increase in organic matter carried with it an increase of 519 lbs. of nitrogen and 72 lbs. of phosphoric acid per acre. Charts show that nitrogen has more influence on high corn yields than has phosphoric acid. Fifty-five per cent of the soils were acid to litmus, a condition causing "clover sickness."—F. M. Schertz.

679. HOFFMANN. **Düngungsversuche mit neuzeitlichen Stickstoffsalzen im Erntejahr 1920.** [Fertilizer experiments with new nitrogen salts in 1920.] *Mitteil. Deutsch. Landw. Ges.* 36: 26. 1921.—The author brings together in tabular form the records of cooperative fertilizer experiments with various salts of nitrogen.—A. J. Pieters.

680. NOYES, H. A., AND G. L. GROUNDS. **Number of colonies for a satisfactory soil plate.** *Proc. Indiana Acad. Sci.* 1918: 93-101. *Pl. 1-2, fig. 1-7.* 1920.—Tests have shown that 30 colonies of bacteria is the optimum number for a petri dish 100 mm. in diameter. Plates carrying between 10 and 100 colonies are satisfactory for computing bacterial counts.—F. M. Schertz.

681. NOYES, H. A., EDWIN VOIGT, AND J. D. LUCKETT. **The length of time to incubate petri plates.** *Proc. Indiana Acad. Sci.* 1918: 102-109. 1920.—Counts made after 10 days' incubation at 20°C. from bacterial dilutions of soil gave reliable results for the bacterial content of the soil, provided the number of bacteria present was small enough to allow all bacteria to develop into colonies. The rapidity with which bacteria develop into colonies varies with the soil and is influenced by soil temperature, moisture, and aeration.—F. M. Schertz.

682. TRUFFAUT, G., ET N. BEZSSONOFF. Étude comparée sur la microflore et la teneur en azote des terres partiellement stérilisées par le sulfur de calcium. [A comparative study of the microorganisms and the nitrogen content of soils partially sterilized by CaS.] Compt. Rend. Acad. Sci. Paris 171: 268-271. 1920.—Soils treated with CaS are found to contain much nitrogen and also *Clostridium pastorianum* and the principal ammonifiers of the soil. When CaS is used in amounts of 150 kg. per hectare in the field the soil is not found to be low in nitrogen.—C. H. Farr.

TAXONOMY OF VASCULAR PLANTS

J. M. GREENMAN, *Editor*

E. B. PAYSON, *Assistant Editor*

(See also in this issue Entries 146, 208, 229, 232, 377, 433)

GENERAL

683. ANONYMOUS. [Rev. of: HITCHCOCK, A. S., AND P. C. STANDLEY. *Flora of the District of Columbia*. Contrib. U. S. Nation. Herb. 21: 1-329. 42 pl. 1919.] Nature 105: 242. 1920.

684. ANONYMOUS. [Rev. of: SCHOOLBRED, W. A. *The flora of Chepstow*. x + 140 p. Taylor & Francis: London, 1920.] Jour. Botany 58: 178-180. 1920.

685. ANONYMOUS. [Rev. of: STONE, WILMER [WITMER]. *The use and abuse of the genus*. Science 51: 427-428. 1920.] Jour. Botany 58: 196-197. 1920.

686. BENNETT, ARTHUR. [Rev. of: LINDMAN, C. A. M. *Svensk Fanerogamflora*. viii + 639 p., 300 illus. P. A. Norstedt & Söners: Stockholm, 1918.] Jour. Botany 58: 153-156. 1920.—See Bot. Absts. 8, Entry 727.

687. BRITTON, NATHANIEL LORD. *Flora of Bermuda (Illustrated)*. 8 vo., 585 p., 1 pl. (colored), 519 fig. Charles Scribner's Sons: New York, 1918.—The present comprehensive work includes the four great phyla of the vegetable kingdom. The Spermatophyta and Pteridophyta have been elaborated by the author. The chapters on the lower groups have been contributed by specialists, as follows: Musci by ELIZABETH G. BRITTON, Hepaticae by ALEXANDER W. EVANS, Lichenes by LINCOLN W. RIDDLE, Fungi by FRED J. SEAVER, and the Algae by MARSHALL A. HOWE. In the case of the Spermatophyta, Pteridophyta, and Bryophyta keys are given which lead to the orders, families, and genera; and under the larger genera keys are also given to the species. Ample descriptions accompany each category, and a limited synonymy is cited. Text-figures well illustrate distinctive species of the more important genera. Neither keys nor illustrations are given for the Thallophyta. No new species, new combinations, nor new names of the higher plants are published in the present volume. The following species of algae are new to science: *Boddlea struweoides* Howe, *Dasya Collinsiana* Howe, *Callithamnion Herveyi* Howe, *Seirospora purpurea* Howe, *Ceramium leptozonum* Howe, and *Nemastoma gelatinosum* Howe. The author adds a chapter on "Bibliography," and one on the "Principal botanical collections made in Bermuda."—J. M. Greenman.

688. EWART, A. J. *Contributions to the flora of Australia*, No. 27. Proc. Roy. Soc. Victoria N.S., 31: 367-378. Pl. 18. 1919.—In connection with work on names of Victorian plants questions arose as to priority and especially as to whether the plants were really native. The decisions and references to the evidence are given for about fifty cases. OSTENFELD's revision of the annual species of *Triglochin* and a key based on his, but including the recognized Australian species, both annuals and perennials, is given.—Some measurements of girth growth in one tree of *Ulmus campestris* L. are appended. The girth did not increase

from July to October, it began to increase in November, was greatest from mid-December to the end of February, remained constant from January to March, decreased 0.2 to 0.3 inches during April, and again remained constant during May and June. Sections showed that cambial growth began a month before girth increase was measurable. Figures of the parasitic activities of *Cassytha melantha* are given.—*Eloise Gerry*.

689. G[ONZÁLEZ] F[RAGOSO], ROMUALDO. [Rev. of: BARNOLA, P. J. M. DE. *Flora vascular del Principado de Andorra*. [Vascular flora of the Principality of Andorra.] Soc. Iber. Cien. Nat. Mem. I. Zaragoza, 1919.] Bol. R. Soc. Española Hist. Nat. 19: 486. 1919.

690. NAKAI, TAKENOSHIN. *Notulae ad plantas Japoniae et Koreae, XXII*. [Notes on plants of Japan and Korea, 22.] Bot. Mag. Tôkyô 34: 35-54. 1920.—The following new species, varieties, and combinations are made: *Dryopteris dentipalea*, *Achyranthes japonica*, *A. molliscula*, *Aconitum mitakense*, *A. paniculigerum*, *A. volubile* vars. *napellifolium* (Seringe) Nakai and *flexuosum* (Reichenbach) Nakai, *Rosa hirtula* (Regel) Nakai, *Tilia Myabei* var. *yessoana*, *Stachys baicalensis* vars. *hispidula* (Ledebour) Nakai and *hispidula* (Regel) Nakai, *S. palustris* var. *Imaii*, *Teucrium brevispicum*, *Pedicularis lunaris*, *Lobelia sessilifolia* var. *latifolia*, *Achillea rhodoptarmica*, *Artemesia stolonifera* var. *laciniata*, and *Cirsium setidens* (Dunn) Nakai.—*Roxana Stinchfield Ferris*.

691. NELSON, J. C. Under which code. Amer. Bot. 26: 129-135. 1920.—A criticism of the American Code with arguments for the universal acceptance of the Vienna Code.—*S. P. Nichols*.

692. TURRILL, W. B. Botanical exploration in Chile and Argentina. Bull. Misc. Inf. Kew 1920: 57-66. 1920.—An extensive list of collectors and districts visited by them.—*E. B. Payson*.

693. WILLEY, FLORENCE. The vegetative organs of some perennial grasses. Proc. Iowa Acad. Sci. 25: 341-367. Fig. 121-144. 1920.—Recognition characters of the rhizomes and young shoots of 26 species of perennial grasses and one undetermined *Carex*. Only external features are given, except in *Poa*.—*H. S. Conard*.

694. ZIMMERMANN, WALTHER. *Badische Volksnamen von Pflanzen III*. [Baden common plant-names.] Mitteil. Badisch. Landesver. Naturk. u. Naturschutz in Freiburg N.S., 1: 49-57, 65-77. 1919.—An extensive list of common names of various plants, chiefly vascular, with the localities in which they are used.—*E. B. Payson*.

PTERIDOPHYTES

695. FONT QUER, P. *Pteridofitas de las Pitiusas*. [Pteridophytes of the Pityuses.] Bol. R. Soc. Española Hist. Nat. 19: 507-511. 1919.—The Department of Botany of the Museum of Natural Sciences of Barcelona has undertaken the study of the flora of the Pityuse Isles, in the Mediterranean about sixty miles east of the mainland of Spain. Several collecting trips extending over parts of two years brought to light a number of pteridophytes not reported before from these islands. Thirteen species are enumerated by the author as having been collected during the trips from the Barcelona Museum, localities and other information being given for the various entries. Mention is made of other botanists who have collected in these islands and considerable discussion is devoted to some of the species found or reported by them. Altogether the pteridophytes now known to occur in the Pityuse Isles number twenty-nine.—*O. E. Jennings*.

696. G[ONZÁLEZ] FRAGOSO, R[OMUALDO]. [Rev. of: CADEVALL Y DIARS, D. J. *Monografía de las Criptogamas vasculares catalanas*. (Monograph of Catalanian vascular cryptogams.) Mem. R. Acad. Cien. y Artes [Barcelona] 15, No. 7. July, 1919.] Bol. R. Soc. Española Hist. Nat. 19: 485-486. 1919.

697. HIERONYMUS, G. *Kleine Mitteilungen über Pteridophyten I.* [Short communications on Pteridophytes I.] *Hedwigia* 59: 319-339. 1918.—Critical notes are given concerning a number of species of *Athyrium* and *Diplazium*. The following new names and combinations occur: *Athyrium mengtzeense*, *A. cognatum* (*Asplenium cognatum* Mett.), *Diplazium vera-pax* (*Asplenium vera-pax* Donn.-Sm.), *D. novoguineense* (*D. silvaticum* (Bory) Sw. var. *novoguineense* Rosenst.), *D. Guildingii* (*Asplenium Guildingii* Jenman), *D. unilobum* (*Asplenium unilobum* Poir.), *D. Kaulfussii*, *D. alienum* (*Asplenium alienum* Mett.), *D. Mearnsii*.—E. B. Payson.

698. HIERONYMUS, G. *Kleine Mitteilungen über Pteridophyten II.* [Short communications on Pteridophytes II.] *Hedwigia* 61: 1-39. 1920.—Extensive notes are given concerning the synonymy, identity, and important characteristics of a number of species of the genus *Asplenium*. The following new names and new combinations are made: *Asplenium squamuligerum* (*A. varians* J. Sm. var. *squamuligera* Rosenst.), *A. fluminense* (*A. lunulatum* var. *fluminense* Lindm.), *A. otites* Link var. *linearilanceolata*, *A. acrocarpum* (*Diplazium acrocarpum* Rosenst.).—E. B. Payson.

699. MERRILL, E. D. On the identity of *Polypodium spinulosum* Burm. f. *Proc. Linn. Soc. New South Wales* 44: 353-354. 1919.—The excellent figure used by BURMAN, "Flora Indica," 1768, as illustrating *Polypodium spinulosum* Burm. f. is questioned. Burman's description is cited as short and imperfect. The writer considers that the plant was not from Java, as stated, but unquestionably is the West Australian species, *Synaphea polymorpha* R. Br., one of the Proteaceae. The adjustment of the synonymy to the name *Synaphea spinulosa* (Burm. f.) is given. It is stated that the species is of wide distribution in West Australia and agrees in all respects with Burman's description and figure.—Eloise Gerry.

700. WATTS, W. W. *Aspidium goggilodus* Schkuhr. *Jour. Botany* 58: 153. 1920.—The author takes exception to the practise of spelling the above specific name, when transferred to *Nephrodium*, as *gongylodes*, and points out that the original spelling probably had a different etymology.—K. M. Wiegand.

SPERMATOPHYTES

701. AMES, O. *Orchidaceae. Illustrations and studies of the family Orchidaceae* 6: *xiv + 335 p., pl. 80-101.* 1920.—This contribution to our knowledge of Malayan and Philippine Orchidaceae consists of two separate papers. The first by OAKES AMES and CHARLES SCHWEINFURTH is entitled "The orchids of Mount Kinabalu, British North Borneo" and the second, by OAKES AMES is entitled "Notes on Philippine Orchids, VII." The paper on Mount Kinabalu orchids is based largely on the collections made by CHAPLAIN JOSEPH CLEMENS in 1915, 222 species being enumerated. Of these, 1 genus and the following species are described as new: *Habenaria crassinervia*, *Chlorosa Clemensii*, *Goodyera rostellata*, *Kuhlthaseltia kinabaluensis*, *Vrydagzynea grandis*, *Nephelaphyllum flabellatum*, *Coelogyne amplissima*, *C. Clemensii*, *C. Clemensii* var. *longiscapa*, *C. compressicaulis*, *C. genuflexa*, *C. kinabaluensis*, *C. longibulbosa*, *C. plicatissima*, *C. radioferens*, *C. rigidiformis*, *Dendrochilum alatum*, *D. angustipetalum*, *D. crassifolium*, *D. exasperatum*, *D. fimbriatum*, *D. Haslamii*, *D. imbricatum*, *D. Jodemensii*, *D. kaborangense*, *D. lancilabium*, *D. lobongense*, *D. longirachis*, *D. perspicabile*, *D. quinquelobum*, *D. subintegrum*, *Pholidota Clemensii*, *P. kinabaluensis*, *P. pectinata*, *Nabalua* new genus, *N. Clemensii*, *Malaxis graciliscapa*, *M. multiflora*, *M. variabilis*, *Oberonia affinis*, *O. kinabaluensis*, *O. patentifolia*, *O. triangularis*, *Liparis grandis*, *L. kaborangensis*, *L. lingulata*, *L. pandurata*, *Arundina gracilis*, *Dendrobium bicarinatum*, *D. crumenatum* Sw. var. *parviflorum*, *D. fusco-pilosum*, *D. kiaense*, *D. longirepens*, *D. minimum*, *D. oblongum*, *D. patentilobum*, *D. singulare*, *D. tricallosum*, *D. tridentatum*, *Eria brevipedunculata*, *E. carnosissima*, *E. farinosa*, *E. latiuscula*, *E. macrophylla*, *E. magnicallosa*, *E. mollicaulis*, *Ceratostylis crassilingua*, *C. longisegmenta*, *Agrostophyllum globigerum*, *Chilopogon kinabaluensis*, *Appendicula divaricata*, *A. foliosa*, *A. linearifolia*, *A. longirostrata*, *A. magnibracteata*, *A.*

minutiflora, *Bromheadia divaricata*, *Phajus subtrilobus*, *Calanthe cuneata*, *C. tenuis*, *Bulbophyllum anguliferum*, *B. caudatisepalum*, *B. concavum*, *B. crassicaudatum*, *B. cuneifolium*, *B. deltoideum*, *B. disjunctum*, *B. eximium*, *B. lanceolatum*, *B. latisepalum*, *B. longimucronatum*, *B. magnivaginatatum*, *B. minutiflorum*, *B. pergracile*, *B. reflexum*, *B. rhizomatosum*, *B. sigmoideum*, *B. venustum*, *B. vinaceum*, *B. vinculibulbum*, *Thelasis carnosa*, *T. variabilis*, *Eulophia ovalifolia*, *Grammatophyllum kinabaluense*, *Cymbidium angustifolium*, *Thrixspermum crescentiforme*, *T. triangulare*, *Trichoglottis magnicallosa*, *T. tenuis*, *Malleola kinabaluensis*, *M. transversisaccata*, *Sarcanthus Merrillianus*, and *Microsaccus longicalcaratus*. New combinations are as follows: *Habenaria Gibbsiae* (Rolfe), *H. kinabaluensis* (Kränzl.), *H. Stapfii* (Kränzl.), *Malaxis kinabaluensis* (Rolfe), *M. amplexans* (J. J. Sm.), *M. bidentifera* (J. J. Sm.), *M. cordifolia* (Rolfe), *M. incurva* (J. J. Sm.), *M. moluccana* (J. J. Sm.), *M. moluccana* var. *sagittata* (J. J. Sm.), *M. nigrescens* (J. J. Sm.), *M. obovata* (J. J. Sm.), and *M. xanthochila* (J. J. Sm.). In the paper on Philippine orchids one new genus, *Philippinaea* Ames & Schltr., is described, based on *Adenostylis Wenzelii*, with the following new combination: *Philippinaea Wenzelii* (Ames) Ames & Schltr. The following species are described as new: *Coelogyne quinquelamellata*, *Dendrochilum binuangense*, *D. ecallosum*, *D. niveum*, *D. propinquum*, *D. purpureum*, *Malaxis cuneipetala*, *M. propinqua*, *M. Taylorii*, *Oberonia leytenensis*, *O. surigaensis*, *Liparis jarensis*, *L. monophylla*, *L. rizalensis*, *Dendrobium busuangense*, *Agrostophyllum leytense*, *Spathoglottis Vanoverberghii*, *Bulbophyllum costatum*, *B. hortensoides*, *B. jarensis*, *B. masaganapense*, *B. philippinense*, *B. semiternum*, *Acriopsis floribunda*, *Saccolabium tenellum*, and *Taeniophyllum leytense*.—E. D. Merrill.

702. ANONYMOUS. [Rev. of: FAWCETT, WILLIAM, AND ALFRED BARTON RENDLE. *Flora of Jamaica*, containing descriptions of the flowering plants known from the island. Vol. 4. Leguminosae to Callitrichaceae. xv + 369 p., 114 fig. Trustees of British Museum: London, 1920.] Jour. Botany 58: 275-277. 1920.—See Bot. Absts. 7, Entry 1435; 8, Entry 703.

703. ANONYMOUS. [Rev. of: FAWCETT, W., AND A. B. RENDLE. *Flora of Jamaica*, containing descriptions of the flowering plants known from the island, Vol. 4. Leguminosae to Callitrichaceae. xv + 369 p., 114 fig. Trustees of British Museum: London, 1920.] Nature 105: 738. 1920.—See Bot. Absts. 7, Entry 1435; 8, Entry 702.

704. ANONYMOUS. [Rev. of: SMALL, JAMES. *The origin and development of the Compositae*. New Phytologist. Reprint No. 11. xi + 334 p. Wm. Wesley & Son: London, 1919.] Jour. Botany 58: 202-204. 1920.—See Bot. Absts. 7, Entry 333; 8, Entry 705.

705. ANONYMOUS. *Ancestral studies of Compositae*. [Rev. of: SMALL, J[AMES]. *The origin and development of the Compositae*. New Phytologist. Reprint No. 11. xi + 334 p., 6 pl. Wm. Wesley & Son: London, 1919.] Nature 105: 450. 1920.—See Bot. Absts. 7, Entry 333; 8, Entry 704.

706. BALFOUR, I. BAILEY. *Some large leaved Rhododendrons*. Rhododendron Soc. Notes 1: 204-222. 1920.—An account of 14 species of the *Falconeri* series of the *Sciadendron* group with a key to the species. Four of the species are new, their technical description will appear in Notes Bot. Gard. Edinburgh.—Alfred Rehder.

707. BEAN, W. J. *The Fortunei group of Rhododendrons*. Rhododendron Soc. Notes 1: 187-194. 1919.—Notes on the taxonomy, history, and ornamental value of the 8 species constituting the *Fortunei* group are given and a key to the species appended.—Alfred Rehder.

708. VELLI, SAVERIO. *Lettura. L' "Althea taurinensis" DC. ed i suoi rapporti colle specie affini crescenti in Italia*. [Lecture. *Althaea taurinensis* DC., its descriptions, together with those of related species growing in Italy.] Atti R. Accad. Sci. Torino 54: 291-314 (173-196). 6 fig. 1919.—A contribution toward clearing up the identity of closely related species of *Althaea* from Italy. Detailed descriptions, citation of synonyms and exsiccatae, critical notes and remarks on the geographical distribution are given. The following new varieties are described: *Althaea taurinensis* DC. var. *Cesatiana*, *A. taurinensis* DC. var. *Regoana*, and *A. taurinensis* DC. var. *dissecta*.—Harriet M. Libby.

709. BITTER, GEORG. *Discopodium penninervium* Hochst. var. *Holstii* (Damm.) Bitt., eine verkannte Pflanze aus Deutsch-Ostafrika. [*Discopodium penninervium* Hochst. var. *Holstii* (Damm.) Bitt., a misunderstood plant from German East Africa.] Bot. Jahrb. 57: 15-17. 1920.—The author discovered two herbarium specimens of a large solanaceous plant, bearing the unpublished name *Solanum Albersi* U. Dammer, which proved to be very hairy examples of another solanaceous species, *Discopodium penninervium*. A study of *Withania Holstii* Dammer showed that it too was identical with these two specimens. In the present paper this hairy form and three others are proposed as new varieties, namely: *Discopodium penninervium* var. *Holstii* (Damm.), var. *nervisequum*, var. *intermedium*, and var. *sparsaeareaneosum*, all from Africa.—K. M. Wiegand.

710. BLAKE, S. F. Nine new plants of the genus *Stylosanthes*. Proc. Biol. Soc. Washington [D. C.] 33: 45-54. 1920.—Nine new species of the genus *Stylosanthes* are described from material in the United States National Herbarium, as follows: *S. gloiodes* from Ecuador, *S. pliscata* from Brazil, *S. macrocarpa*, *S. dianthra*, *S. purpurata*, and *S. subsericea* from Mexico, *S. tuberculata* from Bahama Islands and Cuba, *S. floridana* from Florida, and *S. macrosoma* from Paraguay.—J. C. Gilman.

711. BOULENGER, G. A. On *Rosa britannica* Déséglise. Jour. Botany 58: 185-187. 1920.—This rose, having a wide distribution in England, has appeared under various names, as *R. tomentosa* Smith, *R. foetida* Bast., *R. scabriuscula* Smith, *R. Jundzilliana* Baker, and *R. silvestris* Woods. It has also been confused by Woods with *R. micrantha*. An extended description and discussion are given. The odor of the foliage in roses is not always connected with glands as usually stated in books. Completely smooth leaves of *R. dumetorum* had the apple scent of sweet brier, while very glandular specimens of *R. micrantha* were sometimes devoid of odor.—K. M. Wiegand.

712. BRITTEN, JAMES. *Eugenia lucida*. Jour. Botany 58: 151-152. 1920.—In making a list of LOUREIRO's plants in the National Herbarium the author has noted that an error was made by SEEMANN, who considered *Opa odorata* Lour. and *Syzygium lucidum* Gaertn. synonymous. A sheet in the Banksian Herbarium collected by BANKS on the Endeavour's River, New South Wales, on which GAERTNER based his name, was discovered by Britten, and is not *Opa odorata*.—K. M. Wiegand.

713. BRITTEN, JAMES. *Impatiens glandulifera* Royle (I. Roylei Walp.) forma alba. Jour. Botany 58: 201. 1920.—This form is described as new. It has been distributed by the author to various gardens in England and Ireland, and was also seen by him in the garden of Miss JEKYLL at Munstead.—K. M. Wiegand.

714. BROWN, N. E. New and old species of *Mesembryanthemum*, with critical notes. Jour. Linn. Soc. London Bot. 45: 53-140. Pl. 5-10. 1920.—A critical treatment of many old species of *Mesembryanthemum* and a description of over fifty new species.—A. J. Eames.

715. BROWN, N. E. A new species of *Lobostemon* in the Linnean Herbarium. Jour. Linn. Soc. London Bot. 45: 141-142. 1920.—*Lobostemon magnisepalum* is described as new to science. It is a native of South Africa.—E. B. Payson.

716. CANDOLLE, C. DE. Piperaceae africanae. [Piperaceae of Africa.] Bot. Jahrb. 57: 18-19. 1920.—Three species of *Piper* are discussed and two of *Peperomia*. Of these *Piper Zenkeri* (Kamerun), *Peperomia kyimbilana* (North Nyassaland), and *P. Stolzii* (N. Nyassaland) are described as new.—K. M. Wiegand.

717. CLUTE, WILLARD N. The toad lily. *Tricyrtis hirta*. Amer. Bot. 26: 138-140. 1920.—A description of the flower.—S. P. Nichols.

718. COKER, W. C. *Azalea atlantica* Ashe and its variety *luteo-alba* n. var. Jour. Elisha Mitchell Sci. Soc. 36: 97-99. Pl. 1 (in color), 7. 1920.—This little-known species, abundant on the coastal plain of the Carolinas, is described, and a new variety, namely, *luteo-alba* is proposed.—W. C. Coker.

719. DENSLOW, H. M. Further reflections of an orchid-hunter. Jour. New York Bot. Gard. 21: 145-156. 1920.—The orchid flora even of the eastern states is not yet well known and much more information is needed on the life histories of various species. Herbaria do not contain sufficient specimens to indicate geographical distribution accurately. Field work on orchids must be prosecuted promptly and actively, since the orchid flora is rapidly disappearing.—H. A. Gleason.

720. ENGLER, ADOLPH, UND ERNST GILG. Syllabus der Pflanzenfamilien. [Syllabus of the families of plants.] 8vo, 8th ed., 395 p., 457 fig. Gebrüder Borntraeger: Berlin, 1919.—A comprehensive and epitomized survey of the families of plants from and including the Schizomycetes (Bacteria) to the Compositae of the Dicotyledons. There is included also a brief classification of vegetation from a geographical standpoint. Very few and but minor changes are made from the arrangement given in the seventh edition of this work.—E. B. Payson.

721. FERNALD, M. L. *Gaultheria procumbens* L., forma *suborbiculata*, n. f. Rhodora 22: 155-156. 1920.—An extreme form with strikingly large round leaves, collected in Harwichport, Harwich, Massachusetts.—James P. Poole.

722. FERNALD, M. L. *Lactuca hirsuta* Muhl., forma *calvifolia*, n. f. Rhodora 22: 156. 1920.—This new form differs from the typical *L. hirsuta* in the leaves being glabrous beneath and in some specimens extremely thin and membranous.—James P. Poole.

723. HAMET, RAYMOND. Sur un nouveau *Sedum* chinois de l'herbier du Museum d'Histoire Naturelle de Paris. [A new *Sedum* from China.] Bull. Soc. Bot. Genève 11: 146-150. 1919.—The new species, *Sedum Pinoyi* Hamet, is compared with other species of *Sedum* which are closely related to it.—W. H. Emig.

724. HITCHCOCK, A. S. Revisions of North American grasses: *Isachne*, *Oplismenus*, *Echinochloa*, and *Chaetochloa*. Contrib. U. S. Nation. Herb. 22: 115-208. Pl. 25-32, fig. 21-62. 1920.—Four papers are presented under this title. In the first, eight species of *Isachne* are described, each illustrated by a plate. In the second, four species of *Oplismenus* are described and figured. In the third paper, seven species of *Echinochloa*, one form of which has been cultivated in the United States under the names "billion dollar grass" and "Japanese barnyard millet," are described and figured. Several varieties of *E. crusgalli* are recognized and illustrated, and the following new names occur: *Echinochloa polytachya* (HBK.) Hitchc., *E. oplismenoides* (Fourn.) Hitchc., and *E. crusgalli crus-pavonis* (HBK.) Hitchc. In the fourth paper, twenty-six species of *Chaetochloa*, more widely known as *Setaria*, are described, and all, with the exception of *C. ambigua*, are represented by figures. The following new names occur: *Chaetochloa Poiretiana* (Schult.) Hitchc., *C. palmifolia* (Willd.) Hitchc. & Chase, *C. tenax* (L. Rich.) Hitchc., and *C. Scheelei* (Steud.) Hitchc. The treatment in each paper consists of a short introduction, a description of the genus with its synonyms, and a key to the species. Under each species the synonymy is given, in some cases very extensive, followed by the description and the citation of specimens.—S. F. Blake.

725. LADBROOK, JAMES. A new species of *Coupoui*. Jour. Botany 58: 176-177. 1920.—This new species, *C. micrantha*, was found in the British Museum herbarium among unnamed specimens of *Tabernaemontana*, and was collected by MARTIN in Guiana. This species adds a fourth to the three included in WERNHAM's account of *Coupoui* in Jour. Botany 58: 105-108. 1920.—K. M. Wiegand.

726. LINDAU, G. Acanthaceae africanæ. X. [Acanthaceae of Africa. X.] Bot. Jahrb. 57: 20-24. 1920.—Eight species, in seven genera, are discussed, all new to science: *Hygrophila kyimbilensis* (N. Nyassaland), *Mellera menthiodora* (interior Africa), *Pseudobarleria glandulifera* (Southwest Africa), *Dyschoriste albiflora* (N. Nyassaland), *Barleria* (Eubarleria) *albida* (N. Hereroland), *Asystasia leptostachya* (Kamerun), *A. glandulifera* (Kamerun), and *Anisoles ukambanensis* (Massai Steppes).—K. M. Wiegand.

727. LINDMAN, C. A. M. *Svensk Fanerogamflora*. [Swedish phanerogamic flora.] 8vo, viii + 639 p., many fig. P. A. Norstedt & Söners: Stockholm, Sweden. 1918.—This is a comprehensive manual of the flowering plants of Sweden. The author gives a detailed key to families and distinctive genera based upon the sexual system of Linnaeus. Keys are also given, under the family description, to genera and species. The ENGLER and PRANTL sequence is followed in the arrangement of families. All species are at least briefly described and notes on distribution are included. The book is copiously illustrated with text figures. The following new species and subspecies are described: *Poa alpigena* (*Poa pratensis* L. var. *alpigena* Fries), *Puccinellia Borreri* (*Festuca Borreri* Bab.), *Festuca ovina* L. subsp. *duriuscula* (F. *duriuscula* L.), *Zerna inermis* (*Bromus inermis* Leyss.), *Z. ramosa* (*Bromus ramosus* Huds.), *Z. Benekeni* (*Bromus Benekeni* Syme), *Z. unioides* (*Bromus unioides* HBK.), *Agropyrum violaceum* (*Triticum violaceum* Horn?), *Scirpus atrichus* (*Trichophorum atrichum* Palla), *S. alpinus* (*Eriophorum alpinum* L.), *Betula coriacea* Gunnarss., *B. coriacea* var. *tremuloides* Gunnarss., *B. concinna* Gunnarss., *B. pubescens* Ehrb. subsp. *suecica* Gunnarss., *Atriplex praecox* Hülphers, *Arabis suecica* (*A. thaliana* L. var. *suecica* Fr.), *Crataegus Palmstruchii*, *C. curvisepala*, *Trimorpha elongata* (*Erigeron elongatus* Ledeb.), *T. canadensis* (*Erigeron canadensis* L.). [See also Bot. Absts. 8, 686.]—E. B. Payson.

728. MATTHEWS, J. R. Cheshire roses. Jour. Botany 58: 137-141. 1920.—Notes on distribution and distinguishing characteristics are given on twenty-eight species and several varieties of roses occurring in Cheshire. The notes are partly from the author's material, and partly compiled from those of COLONEL WOLLEY-DOD.—K. M. Wiegand.

729. MERRILL, E. D. New or noteworthy Philippine plants, XV. Philippine Jour. Sci. 14: 365-457. 1919.—Besides 18 species previously unknown from the Philippines, the following are described as new to science: *Pandanus panayensis*, *P. camarinensis*, *Andropogon philippinensis*, *A. gryllus* L. var. *philippensis*, *Mariscus niveus* (*Schoenus niveus* Murr.), *Cryptocoryne aponogetifolia*, *C. pygmaea*, *Elatostema panayense*, *E. Macgregorii*, *E. zamboangense*, *E. acumatissimum*, *E. Robinsonii*, *E. pilosum*, *E. suborbiculare*, *E. diversilimbum*, *E. appendiculatum*, *Elatostematoides samarensis*, *Aristolochia membranacea*, *Haematocarpus subpellatus*, *Artabotrys monogynus*, *A. cagayensis*, *Goniothalamus lancifolius*, *G. longistylus*, *Mitrephora cagayanensis*, *Oxymitra multinervia*, *O. platyphylla*, *Papualthia heteropetala*, *Phaeanthus pubescens*, *P. villosus*, *Polyalthia dolichophylla*, *Pseuduvaria grandiflora*, *Uvaria panayensis*, *U. Macgregorii*, *Cryptocarya Ramosii*, *C. euphlebica*, *C. elliptifolia*, *Neolitsia lanceolata*, *N. paucinervia*, *Polyosma villosa*, *P. longipetiolata*, *Pittosporum pseudostipitatum*, *P. acuminatissimum*, *P. glaberrimum*, *Connarus castaneus*, *Rourea luzoniensis*, *Ormosia orbiculata*, *O. Clementis*, *O. basilanensis*, *O. grandifolia*, *Evodia sessilifoliola*, *Aglaia diffusiflora*, *Semecarpus subsessilifolia*, *S. ferruginea*, *Oncocarpus obovatus* (*Dichapetalum obovatum* Elm.), *Parishia oblongifolia*, *Villaresia philippinensis*, *V. latifolia*, *Miquelia philippinensis*, *Allophylus stenophyllum*, *Guioa parvifoliola*, *Elaeocarpus ilocanus*, *Pterospermum megalanthum*, *Dillenia megalophylla*, *Saurauia Santosii*, *Homalium Ramosii*, *Begonia Collisiae*, *B. lancilimba*, *B. obtusifolia*, *B. rubrifolia*, *B. serpens*, *B. panayensis*, *B. platyphylla*, *Cloëzia urdanetensis* (*Photinia urdanetensis* Elm.), *Tristania oblongifolia*, *Medinilla oblanceolata*, *Memecylon Ramosii*, *M. stenophyllum*, *Otanthiera strigosa*, *Astronia brachybotrys*, *Schefflera obtusifolia*, *S. Alvarezii*, *S. globosa*, *S. platyphylla*, *S. Santosii*, *S. panayensis*, *Boerlagiodendron caudatum*, *Vaccinium ilocanum*, *Diplycosia glabra*, *Ardisia ilocana*, *A. longipetiolata*, *Amblyanthopsis crassifolia*, *Palagium glabrifolium*, *Symplocos brachybotrys*, *Geniostoma pachyphyllum*, *Alyxia retusa*, *Rauwolfia membranacea*, *Tabernaemontana ecarinata*, *Callicarpa obtusifolia*, *Cyrtandra ilocana*, *C. panayensis*, *C. Santosii*, *C. lancifolia*, *Hemigraphis nummularifolia*, *Vernonia glandulifolia*.—Albert R. Sweetser.

730. MERRILL, E. D. Notes on the flora of Sumatra. Philippine Jour. Sci. 14: 239-250. 1919.—It is estimated that since the publication of MIGUEL's "Flora Sumatra" not over 500 species have been added, bringing the number of species of Spermatophytes to approximately 3000. From a collection by BARTLETT and LA RUE, aggregating about 500 numbers, several

species not previously credited to Sumatra are enumerated and a few new species are described. The following is a list of species new to science and new combinations included in the paper: *Oreocnide nivea*, *Litsea umbellata* (*Hexanthus umbellatus* Lour.), *Leea indica* (*Staphylea indica* Burm. f.), *Osmelia Bartlettii*, *Memecylon Laruei*, *Callicarpa brevipetiolata*, *Blumea pubigera* (*Conyza pubigera* L.).—Albert R. Sweetser.

731. MOORE, SPENCER LE M. *Alabastra diversa*.—Part XXXIII. Jour. Botany 58: 187-195, 219-226, 267-271. 1920.—1. Plantarum Mascarensium pugillus. The genera *Homaliopsis* (Flacourtiaceae) and *Vaughania* (Leguminosae, tribe Galegae) are described as new, and the following new species are proposed: *Homaliopsis Forbesii*, Madagascar; *Vaughania dionaeaeifolia*, Madagascar; *Noronhea comorensis*, Comoro Islands; *Lasiosiphon hibbertioides*, Madagascar. 2. Acanthaceae Papuanae. The genus *Hulemacanthus* (tribe Justiceae) is described as new, several known species are listed, and the following new species and varieties are proposed: *Hemigraphis suborbicularis*, Bismarck Archipelago; *H. Whitei*, Yule Island; *H. ciliata*, Mekeo District; *Pseuderanthemum confertum*, Yule Island; *P. Bradtkei*, Bismarck Archipelago; *P. Armitii*, Papua; *Justicia Chalmersii* Lind., var. *latifolia*, Sapphire Creek; *Justicia platyphylla*, Astrolabe Range; *Hulemacanthus Whitei*, Deva Deva. 3. Miscellanea Africana. The following genera, species, and varieties are described as new: *Nectaropetalum congolense*, Mayumbe; *Umbellulanthus* gen. nov. (Erythroxylaceae), *U. floribundus*, Mayumbe; *Monocephalum* gen. nov. (Icacinaceae), *M. Batesii*, Cameroons; *M. Zenkeri*, Cameroons; *Stachyanthus nigeriensis*, S. Nigeria; *S. obovatus*, Mayumbe; *Pyrenacantha sylvestris*, Mayumbe; *Rhaphiostyles ferruginea* Engl., var. *parvifolia*; *Strombosia retevenia*, S. Nigeria; *S. majuscula*, Portuguese Congo; *S. toroensis*, Toro; *S. Grossweileri*, Mayumbe; *Strombosiopsis buzifolia*, Mayumbe; *Coula utilis*, Mayumbe; *Batesanthus intrusus*, Yaunde; *Anisopus Batesii*, Yaunde; *Aristolochia ceropegiooides*, Yaunde; *A. Ju-ju*, South Nigeria; *Drypetes peltophora*, Yaunde; *D. Taylorii*, E. Africa; *D. Grossweileri*, Portuguese Congo.—K. M. Wiegand.

732. PENNELL, FRANCIS W. *Scrophulariaceae of the southeastern United States*. Proc. Philadelphia Acad. Sci. 71: 224-291. 1919.—Extensive keys intended to "include all features of evident contrast" are given for the 38 genera and 123 species known to occur in the area from North Carolina to Florida and west to the Mississippi river. The work is based largely upon notes from fresh flowers. Habitat, distribution, date of flowering, color of corolla, and references to herbarium material are given for each species.—Leva B. Walker.

733. PUGSLEY, H. W. *Plantago alpina* and *P. maritima*. Jour. Botany 58: 149-150. 1920.—It is often with difficulty that dwarf plants of *P. maritima* are distinguished from plants of *P. alpina*. In the spring, however, when growth is beginning the two species can be more clearly differentiated. The author discusses these structural and habitat differences as based on plants growing in his garden, where *P. alpina* flowers earlier and more sparingly than *P. maritima*.—K. M. Wiegand.

734. REHDER, ALFRED. *New species, varieties and combinations from the herbarium and the collections of the Arnold Arboretum*. Jour. Arnold Arboretum 2: 121-128. 1920.—The present article contains two new species of *Lonicera*, *L. subsessilis* from Korea and *L. demissa* from Japan, and the following hybrids, species and varieties based on cultivated plants: \times *Prunus Arnoldiana*, \times *P. Meyeri*, *P. Padus* var. *laxa*, *Acanthopanax ternatus*, \times *Viburnum Jackii*, and *Physocarpus intermedius* f. *parvifolius*.—Alfred Rehder.

735. RIDLEY, HENRY N. *Plantago Cynops* L. in Kent. Jour. Botany 58: 271-272. 1920.—The above species, a native of the chalk barrens of southern Europe, was found by CHARLES BAKER on similar chalk downs between Cobham and Meopham in Kent. It is apparently entirely absent from northern France. The Kent downs are peculiar in harboring other plants that are rare in England.—K. M. Wiegand.

736. ROBINSON, B. L. Further diagnoses and notes on tropical American Eupatorieae. Contrib. Gray Herb. N. S., 61: 3-30. 1920.—The following new genus, new species and varieties, new names and combinations occur: *Ageratum rivale*, *Alomia chiriquensis*, *Eupatorium aequinoctiale*, *E. Blakei*, *E. eucosum*, *E. gymnoxymorphum* Rusby (*E. gymnoxoides* Rusby), *E. huigrense*, *E. Kalenbornianum*, *E. longipetiolatum* Sch. Bip. var. *typicum*, *E. longipetiolatum* Sch. Bip. var. *arbusculare*, *E. pichinchense* HBK. forma *typicum*, *E. pichinchense* HBK. forma *glandulare*, *E. polopolense*, *E. prionophyllum* Robinson var. *typicum*, *E. prionophyllum* Robinson var. *asymmetrum*, *E. trinitense* Rusby & Robinson (*Baccharis trinitensis* Ktze.), *Mikania amblyolepis*, *M. Andrei*, *M. bullata*, *M. clematidiflora* Rusby, *M. filicifolia*, *M. flabellata* Rusby, *M. globifera* Rusby, *M. gracilipes*, *M. Hioramii* Britton & Robinson, *M. Jamesonii*, *M. lancifolia*, *M. ligustrifolia* DC. var. *subsessilis*, *M. Mathewii*, *M. miconioides*, *M. Pennellii*, *M. rugosa*, *M. Seemannii*, *M. tarapotensis*, *M. trachodes*, *M. vitrea*, *Sphaereupatorium* Ktze., *S. Hoffmannii* Ktze., *Ophryosporus eleutherantherus* (*Eupatorium eleutherantherum* Rusby), *Eupatorium nicaraguense*.—E. B. Payson.

737. ROBINSON, B. L. The Eupatoriums of Bolivia. Contrib. Gray Herb. N. S., 61: 30-80. 1920.—The author gives a brief historical account of the progress of taxonomy in Bolivia with particular reference to species of *Eupatorium*, of which 68 species are now known to occur in Bolivia. Of these, 29 are known only from Bolivia. There is reason to suppose that of the Eupatoriums indigenous to Bolivia a great part are still to be discovered. In the present paper the species are grouped under the sections to which they are referred and subsectional keys given to the species. Species previously undescribed in the present series of papers are accompanied by a complete diagnosis: Specimens are cited for all species. The following new varieties and forms and new combinations are included: *Eupatorium tunariense* (*E. conyzoides* [Vahl] Ktze. var. *tunariense* Hieron.), *E. patens* D. Don var. *typicum*, *E. pyramidale* Klatt var. *angustifolium* (*E. amygdalinum* Lam. var. *revolutum* [Pohl] Bak. forma *angustifolium* Hieron.), *E. rufescens* Lund. var. *typicum*.—E. B. Payson.

738. RYDBERG, PER AXEL. Rosales. Fabaceae: Psoraleae. North Amer. Flora [New York] 24: 65-136. 1920.—The author completes the treatment of the genus *Parosela* and elaborates the genera *Thornbera*, *Petalostemon*, and *Kuhnistera*. The following new species are described and new combinations made: *Parosela lagopina*, *P. exserta*, *P. Barberi* Rose, *P. lucida* Rose, *P. fissa*, *P. Bigelovii*, *P. pilifera*, *P. Townsendii*, *P. ervoides* (*Dalea ervoides* Benth.), *P. costaricana*, *P. leporina* (*Psoralea leporina* Ait.), *P. alopecuroides* (*Dalea alopecuroides* Willd.), *P. Thouini* (*Dalea Thouini* Schrank), *P. flava* (*Dalea flava* Mart. & Gal.), *P. elata* (*Dalea elata* H. & A.), *P. roseola*, *P. citrina*, *P. caudata*, *P. attenuata*, *P. bicolor* (*Dalea bicolor* Willd.), *P. quinqueflora* (*Dalea quinqueflora* Brand.), *P. Lloydii*, *P. laxa*, *P. minutifolia*, *P. Conzattii*, *P. tuberculina*, *P. fulvosericca*, *P. polycephala* (*Dalea polycephala* Benth.), *P. decora* (*Dalea decora* S. Shauer), *P. dorycnoides* (*Dalea dorycnoides* DC.), *P. pilosissima*, *P. abietifolia* Rose, *P. subvillosa*, *P. scariosa* (*Dalea scariosa* S. Wats.), *P. trifoliolata* (*Dalea trifoliolata* Moric.), *P. reclinata* (*Psoralea reclinata* Cav.), *P. versicolor* (*Dalea versicolor* Zucc.), *P. tsugoides*, *P. megalostachys* Rose, *P. sanctae-crucis*, *P. leucantha*, *P. sessilis* (*Dalea Wislizeni* var. *sessilis* A. Gray), *P. leucosericea*, *P. longifolia* Rose, *P. roseiflora*, *P. Smithii*, *P. glabrescens*, *P. involuta*, *P. melantha* (*Dalea melantha* S. Schauer), *P. fuscescens*, *P. zimapanica* (*Dalea zimapanica* S. Schauer), *P. diversicolor*, *P. argyrostachya* (*Dalea argyrostachya* H. & A.), *P. Botterii*, *P. gigantea* Rose, *P. atrocyanea*, *P. Wardii*, *P. caudata*, *P. capitulata*, *P. tehuacana*, *P. emphysodes* (*Psoralea emphysodes* Jacq.), *P. scandens* (*Psoralea scandens* Mill.), *P. floridana*, *P. humilis* (*Psoralea humilis* Mill.), *P. vulneraria* (*Dalea vulneraria* var. *typica* Oerst.), *P. occidentalis*, *P. platyphylla*, *P. barbata* (*Dalea vulneraria* var. *barbata* Oerst.), *Thornbera lutea*, *T. Watsoni* (*Parosela Watsoni* Rose), *T. villosa*, *T. leucantha*, *T. Ordiae* (*Dalea Ordiae* A. Gray), *T. Grayi* (*Parosela Grayi* Vail), *T. revoluta* (*Dalea revoluta* S. Wats.), *T. Pringlei* (*Dalea Pringlei* A. Gray), *T. Nelsonii* (*Dalea Nelsonii* Rose), *T. pumila*, *T. Dalea* (*Psoralea Dalea* L.), *T. robusta*, *Petalostemon truncatus*, *P. sonorae*, *P. pilulosus*, *P. confusus*, *P. evanescens* Rose (*Dalea evanescens* Brand.), *P. obreniformis*, *P. Standleyanus*, *P. lagopus*, *P. Rothrockii*, *Kuhnistera adenopoda* (*Petalostemon corymbosum* var. *adenopodum* B. L. Robinson).—E. B. Payson.

739. SALMON, C. E. *Ranunculus Lingua*. Jour. Botany 58: 275. 1920.—The occurrence of *R. Lingua* var. *glabratus* Wallr. is recorded in Great Britain.—K. M. Wiegand.

740. SARGENT, C. S. Notes on North American trees VII. Jour. Arnold Arboretum 2: 112-121. 1920.—This article deals with *Prunus* and *Aesculus* and the following new combination and new varieties and one new hybrid are proposed: *Prunus americana* var. *floridana*, *P. mexicana* var. *reticulata* (Sarg.), *P. mexicana* var. *polyandra* (Sarg.), *P. mexicana* var. *fultonensis* (Sarg.), *P. virginiana* var. *demissa* f. *pachyrrhachis* (Koehne), *P. virginiana* var. *melanocarpa* (A. Nels.), *P. virens* var. *rufula* (Wooton & Standl.), *Aesculus octandra* var. *virginica*, *A. georgiana* var. *lanceolata*, × *A. mississippiensis*. (See also Bot. Absts. 1, Entries 812, 1127, 1128; 3, Entry 1837; 4, Entry 1766; 7, Entry 2232.)—Alfred Rehder.

741. SCHNEIDER, CAMILLO. Notes on American willows X. Jour. Arnold Arboretum 2: 65-90. 1920.—The present article deals with the sections *Fulvae* and *Roseae* each containing 3 species, with 2 species of doubtful affinity and a species of the section *Glaucæ* omitted from the treatment of that section. As in the preceding articles the synonymy, nomenclature, distribution and relationship of the species and varieties are discussed at length and the following new combinations proposed: *Salix Bebbiana* var. *perrostrata* (Rydb.), *S. Geyeriana* var. *argentea* (Bebb), and *S. Scouleriana* var. *Austinae* (Bebb). (See also Bot. Absts. 1, Entries 801, 813; 3, Entries 1838, 1839; 4, Entries 1769, 1770; 7, Entries 1490, 2238, 2239.)—Alfred Rehder.

742. STANDLEY, PAUL C. A new species of *Campnosperma* from Panama. Jour. Arnold Arboretum 2: 111-112. 1920.—*Campnosperma panamensis* is described as a new species of a genus known before in America only from a single Brazilian species.—Alfred Rehder.

743. STANDLEY, PAUL C. Six new species of plants from Mexico. Proc. Biol. Soc. Washington [D. C.] 33: 65-68. 1920.—Four plants belonging to the family Polygonaceae one to the Aristolochiaceae and one to the Hydrangeaceae are described from Mexico as new species. They are: *Aristolochia malacophylla*, *Podopterus cordifolius*, *Ruprechtia occidentalis*, *Coccoloba acapulcensis*, *C. chiapensis*, and *Fendlerella lasiopetala*.—J. C. Gilman.

744. STANDLEY, PAUL C. Trees and shrubs of Mexico (Gleicheniaceae-Betulaceae). Contrib. U. S. Nation. Herb. 23: 1-169. 1920.—This paper forms the first part of a volume intended to provide a keyed synopsis of the woody plants of Mexico, and an account of their local names and uses. After a short introduction describing the general features of Mexican botany, the plan of the work is discussed, and a short history of the early botanical exploration of Mexico up to the time of HUMBOLDT is given. This is followed by a key to the families. Under the families keys are given to the genera and species, and under each species a brief description is generally given. The chief synonymy is included under each species, with an account of the range and the local names and uses. The ferns have been treated by W. R. MAXON, the grasses by A. S. HITCHCOCK, and the Amaryllidaceae by W. TRELEASE. The larger genera included in this part of the work are the following: *Agave*, with 170 species; *Piper*, with 59; *Pinus*, with 26; and *Chamaedorea*, with 25. The following new species and new names occur: *Inodes mexicana* (Mart.) Standl., *I. japonica* (C. Wr.) Standl., *Yucca jaliscensis* Trel., *Agave panamana* Trel., *A. stringens* Trel., *A. subtilis* Trel., *A. pedrosana* Trel., *A. Gutierreziana* Trel., *A. palmaris* Trel., *A. rhodacantha* Trel., *A. pes-mulae* Trel., *A. pacifica* Trel., *A. pseudotequilana* Trel., *A. Sullivani* Trel., *A. yaquiana* Trel., *A. rasconensis* Trel., *A. guadalajarana* Trel., *A. felina* Trel., *A. subzonata* Trel., *A. mapisaga* Trel., *A. Bourgaei* Trel., *A. mirabilis* Trel., *A. abrupta* Trel., *A. Wercklei* Weber, *A. flexispina* Trel., *A. Eduardi* Trel., *A. pedunculifera* Trel., *A. potrerana* Trel., *A. inopinabilis* Trel., *A. convallis* Trel., *A. dissimulans* Trel., *A. angustiarum* Trel., *A. victoriae-reginae* f. *Nichelsi* (Roland-Gosselin) Trel., *A. Mulfordiana* Trel., *A. Schottii* var. *atricha* Trel., *A. angustissima* var. *Ortgiesiana* (Baker) Trel.—S. F. Blake.

745. STEPHENSON, T., AND T. A. STEPHENSON. A new marsh Orchis. Jour. Botany 58: 165-170. 3 fig. 1920.—*Orchis purpurella* is described as new, consisting of two forms desig-

nated as A and B. Four points are given special attention: Form of the lip, its color, spots on the leaves, and dwarf habit. These are discussed in relation to various closely related species, as *O. salina* Turcz., *O. cruenta* Müll., *O. Fuchsii* Druce, *O. ericetorum* Linton, *O. praetermissa* var. *pulchella* Druce, *O. latifolia* L., and *O. incarnata*, with the conclusion that *O. purpurella* is a valid species, differing from the above species by the characters given. The form B is closely related to *O. cruenta* but can scarcely be referred to it, neither is it a dwarf form of *O. latifolia*. Hybrids of *O. purpurella* with a dwarf form of *O. latifolia* and with *O. ericetorum* are noted. The forms described may have arisen by crossings of *O. incarnata* or *O. praetermissa* with *O. latifolia* or *O. maculata*, but the theory is favored that they are mutations from *O. incarnata*.—K. M. Wiegand.

746. STEPHENSON, T., AND T. A. STEPHENSON. The genus *Epipactis* in Britain. Jour. Botany 58: 209-213. Pl. 555. 1920.—A critical study of *Epipactis* and *Orchis* extending over several years resulted in a paper too large to publish as a whole. The present article contains the important conclusions with respect to *Epipactis*. Five species are recognized for Britain: *E. palustris* Crantz, *E. atropurpurea* Raf., *E. viridiflora* Rehb., *E. purpurata* Sm., and *E. latifolia* Allm. The distinguishing features between the species are noted and discussed. *E. latifolia* should include *E. media* Fries and *E. atroviridis* Linton. The conclusion is reached that lip-bosses and details of leaf-scheme on which the last two species' names were founded are very unstable and of no value as specific characters. These two names should be dropped. It is not believed that *E. media* and *E. atroviridis* are hybrids, as they do not behave like other hybrids with which the authors are acquainted.—K. M. Wiegand.

747. STEPHENSON, T., AND T. A. STEPHENSON. The British palmate orchids. Jour. Botany 58: 257-262. 1 pl. 1920.—This is a summary of several years' work on the marsh and spotted orchids. Notwithstanding the great number of forms which more or less intergrade, certain "landmarks" or species and certain hybrids may be recognized. The British palmate orchids comprise the following species: *Orchis incarnata* L., *O. purpurella* Stephenson, *O. ericetorum* Linton, *O. praetermissa* Druce, *O. latifolia* L., and *O. Fuchsii* Druce. The characteristics of each of these is discussed, and reasons given for the belief that they are true species. The colored plate which serves to illustrate previous papers by these authors as well as papers to follow, is discussed in detail, and the differences between the species and peculiarities of the hybrids as they appear in the plate are pointed out.—K. M. Wiegand.

748. SVENSON, H. K. A northeastern variety of *Panicum*. Rhodora 22: 153-155. 5 fig. 1920.—The author describes *Panicum dichotomiflorum* Michx. var. *puritanorum*, n. var., from Massachusetts.—James P. Poole.

749. SWINGLE, WALTER T. A new species of *Pistacia* native to southwestern Texas, *P. texana*. Jour. Arnold Arboretum 2: 105-110. 1920.—The *Pistacia* of southwestern Texas and northern Mexico formerly included under *P. mexicana* HBK. is described as a new species, *P. texana*.—Alfred Rehder.

750. VICIOSO, CARLOS. Una especie nueva del genero *Gypsophila*. [A new species of the genus *Gypsophila*.] Bol. R. Soc. Española Hist. Nat. 19: 493-494. 1919.—*Gypsophila Ceballosi* Pau & C. Vic., collected in Escorial, central Spain.—O. E. Jennings.

751. VISCHER, W. Sur les *Quararibea* Aubl. un genre de Bombacées à ovaire infère. [Concerning the species of *Quararibea* Aubl. a genus of the family Bombacaceae with inferior ovaries.] Bull. Soc. Bot. Genève 11: 199-210. 5 fig. 1919.—The characteristics of the various types of flowers of the genus *Quararibea* are given. A number of new combinations are introduced and a new species, *Quararibea Chodati* Vischer, is described.—W. H. Emig.

MISCELLANEOUS, UNCLASSIFIED PUBLICATIONS

B. E. LIVINGSTON, *Editor*S. F. TRELEASE, *Assistant Editor*

752. ANONYMOUS. Turning a liability into an asset. *Sci. Amer. Monthly* 2: 129. 1920.—The commercial possibilities of the water hyacinth (*Eichornia crassipes*) are discussed.—*Chas. H. Otis*.

753. ANONYMOUS. [Rev. of: SPITTA, E. J. *Microscopy: the construction, theory, and use of the microscope*. 3d ed., xxviii + 537 p., 28 pl. John Murray: London, 1920.] *Nature* 106: 77-78. 1920.—In the present edition may be noted especially the reference to low power objectives designed to give great depth of focus and a flat field. The book is illustrated by a considerable number of new plates.—*O. A. Stevens*.

754. DURAND, R. Bactéries et papier-monnaie. [Bacteria and paper money.] *Bull. Sci. Pharm.* 27: 357-358. 1920.—A single bill of paper money may contain as many as 100,000 bacteria. These belong chiefly to the bacteria of the intestinal flora, but bacilli communicating contagious diseases were also found.—*H. Engelhardt*.

755. INGLE, HARRY. The oil industry. [Rev. of: MARTIN, GEOFFREY. *Animal and vegetable oils, fats, and waxes: their manufacture, refining, and analysis, including the manufacture of candles, margarine and butter*. A practical treatise. x + 218 p. Crosby Lockwood and Son: London, 1920.] *Nature* 106: 43-44. 1920.

756. SIMMONDS, C. Possible new sources of power alcohol. *Nature* 106: 244-245. 1920.—Two reports of British committees are referred to. Foodstuffs will probably be too valuable for yet some time for use on any large scale as sources of alcohol. It has been suggested that there is in Ireland considerable waste land which could be used for crops to be used in this way, and some work has been started in this direction. In tropical regions cassava, arrowroot, and maize might be practicable. One plant (*Polymnia edulis*) from the Andes is said to be under trial in France. Utilization of cellulose materials, such as straw and sawdust, is also considered.—*O. A. Stevens*.

757. SLADE, R. E., AND G. I. HIGSON. A simple apparatus for high-power photomicrography. *Sci. Prog.* [London] 14: 645-646. 1920.—An apparatus designed for the rapid production of photomicrographs of emulsions.—*J. L. Weimer*.

758. SPRINGER, J. F. Water pipes of wood. *Sci. Amer.* 123: 250, 262, 264. 3 fig. 1920.

759. TEVIS, M. Forty centuries ago—and now. *Sci. Amer.* 123: 397. 1920.—The paper concerns the possibility of again making paper from *Papyrus*.—*Chas. H. Otis*.

760. WINTERS, S. R. Binder twine from Florida. *Sci. Amer.* 123: 379. 2 fig. 1920.—A brief article on sisal.—*Chas. H. Otis*.

M. J. Dorsey

BOTANICAL ABSTRACTS

A monthly serial furnishing abstracts and citations of publications in the international field of botany in its broadest sense

PUBLISHED MONTHLY UNDER THE DIRECTION OF

THE BOARD OF CONTROL OF BOTANICAL ABSTRACTS, INC.

A democratically constituted organization, with members representing many societies interested in plants.

THE SOCIETIES NOW REPRESENTED

AND

THE MEMBERS OF THE BOARD OF CONTROL

(The Members of the Executive Committee for 1921 are indicated by asterisks)

American Association for the Advancement of Science, Section G.

R. A. HARPER, Columbia University, New York City.

B. E. LIVINGSTON, Johns Hopkins University, Baltimore, Maryland.

Botanical Society of America, General Section.

H. A. GLEASON, New York Botanical Garden, New York City.

*B. M. DAVIS, University of Michigan, Ann Arbor, Michigan.

Botanical Society of America, Physiological Section.

OTIS F. CURTIS, Cornell University, Ithaca, New York.

*B. M. DUGGAR (Chairman of the Board), Missouri Botanical Garden, St. Louis, Missouri.

Botanical Society of America, Systematic Section.

MARSHALL A. HOWE, New York Botanical Garden, New York City.

J. H. BARNHART, New York Botanical Garden, New York City.

Botanical Society of America, Mycological Section.

C. H. KAUFFMAN, University of Michigan, Ann Arbor, Michigan.

BRUCE FINK, Miami University, Oxford, Ohio.

American Society of Naturalists.

H. H. BARTLETT, University of Michigan, Ann Arbor, Michigan.

*J. A. HARRIS, Department of Genetics, Carnegie Institution of Washington, Cold Spring Harbor, L. I., New York.

Ecological Society of America.

H. L. SHANTZ, U. S. Bureau of Plant Industry, Washington, D. C.

*FORREST SHREVE, Desert Laboratory, Carnegie Institution, Tucson, Arizona.

Paleontological Society of America.

ARTHUR HOLLICK, 61 Wall Street, New Brighton, New York.

E. W. BERRY, Johns Hopkins University, Baltimore, Maryland.

American Society of Agronomy.

C. B. HUTCHISON, Cornell University, Ithaca, New York.

C. A. MOORE, University of Tennessee, Knoxville, Tennessee.

Society for Horticultural Science.

V. R. GARDNER, University of Missouri, Columbia, Missouri.

E. J. KRAUS, University of Wisconsin, Madison, Wisconsin.

American Phytopathological Society.

L. R. JONES, University of Wisconsin, Madison, Wisconsin.

*DONALD REDDICK, Cornell University, Ithaca, New York.

Society of American Foresters.

RAPHAEL ZON, U. S. Forest Service, Washington, D. C.

J. S. ILLICK, Pennsylvania Department of Forestry, Harrisburg, Pennsylvania.

American Conference of Pharmaceutical Faculties.

HEBER W. YOUNGKEN, Philadelphia College of Pharmacy and Science, Philadelphia, Pennsylvania.

HENRY KRAEMER, Mt. Clemens, Michigan.

Canadian Society of Technical Agriculturists.

W. P. THOMPSON, University of Saskatchewan, Saskatoon, Saskatchewan.

B. T. DICKSON, Macdonald College, Macdonald College, Quebec.

Royal Society of Canada.

No elections.

At large.

W. A. ORTON, U. S. Bureau of Plant Industry, Washington, D. C.

WILLIAMS & WILKINS COMPANY

BALTIMORE, U. S. A.

Entered as second-class matter, November 9, 1918, at the post office at Baltimore, Maryland, under the Act of March 3, 1879

Copyright 1921, Williams & Wilkins Company

Price, net postpaid, per volume: { \$3.00, United States, Mexico, Cuba
\$3.12, Canada; \$3.25, Other Countries

CONTENTS

Agronomy.....	761- 823
Bibliography, Biography and History.....	824- 923
Botanical Education.....	924- 930
Cytology.....	p. 134
Ecology and Plant Geography.....	931- 986
Forest Botany and Forestry.....	987-1051
Genetics.....	1052-1127
Horticulture.....	1128-1205
Morphology, Anatomy and Histology of Vascular Plants.....	1206-1220
Morphology and Taxonomy of Algae.....	1221-1257
Morphology and Taxonomy of Bryophytes.....	1258-1271
Morphology and Taxonomy of Fungi, Lichens, Bacteria and Myxomycetes.....	1272-1335
Paleobotany and Evolutionary History.....	1336-1343
Pathology.....	1344-1435
Pharmaceutical Botany and Pharmacognosy.....	1436-1447
Physiology.....	1448-1508
Soil Science.....	1509-1538
Taxonomy of Vascular Plants.....	1539-1572
Miscellaneous, Unclassified Publications.....	1573-1582

BOARD OF EDITORS FOR 1921 AND ASSISTANT EDITORS

Editor-in-Chief, J. R. SCHRAMM
Cornell University, Ithaca, New York

EDITORS FOR SECTIONS

- Agronomy.** C. V. PIPER, U. S. Bureau of Plant Industry, Washington, D. C.—Assistant Editor, MARY R. BURR, U. S. Bureau of Plant Industry, Washington, D. C.
- Bibliography, Biography and History.** NEIL E. STEVENS, U. S. Bureau of Plant Industry, Washington, D. C.
- Botanical Education.** C. STUART GAGER, Brooklyn Botanic Garden, Brooklyn, New York.—Assistant Editor, ALFRED GUNDERSEN, Brooklyn Botanic Garden, Brooklyn, New York.
- Cytology.** GILBERT M. SMITH, University of Wisconsin, Madison, Wisconsin.—Assistant Editor, GEO. S. BRYAN, University of Wisconsin, Madison, Wisconsin.
- Ecology and Plant Geography.** H. C. COWLES, The University of Chicago, Chicago, Illinois.—Assistant Editor, GEO. D. FULLER, The University of Chicago, Chicago, Illinois.
- Forest Botany and Forestry.** RAPHAEL ZON, U. S. Forest Service, Washington, D. C.—Assistant Editor, J. V. HOFMANN, U. S. Forest Service, Wind River Experiment Station, Stabler, Washington.
- Genetics.** GEORGE H. SHULL, Princeton University, Princeton, New Jersey.—Assistant Editor, J. P. KELLY, Pennsylvania State College, State College, Pennsylvania.
- Horticulture.** J. H. GOURLEY, Ohio Agricultural Experiment Station, Wooster, Ohio.—Assistant Editor, H. E. KNOWLTON, West Virginia University, Morgantown, West Virginia.
- Miscellaneous, Unclassified Publications.** BURTON E. LIVINGSTON, The Johns Hopkins University, Baltimore, Maryland.—Assistant Editor, SAM F. TRELEASE, The Johns Hopkins University, Baltimore, Maryland.
- Morphology, Anatomy and Histology of Vascular Plants.** E. W. SINNOTT, Connecticut Agricultural College Storrs, Connecticut.
- Morphology and Taxonomy of Algae.** E. N. TRANSELLO, Ohio State University, Columbus, Ohio.
- Morphology and Taxonomy of Bryophytes.** ALEXANDER W. EVANS, Yale University, New Haven, Connecticut.
- Morphology and Taxonomy of Fungi, Lichens, Bacteria and Myxomycetes.** H. M. FITZPATRICK, Cornell University, Ithaca, New York.
- Paleobotany and Evolutionary History.** EDWARD W. BERRY, The Johns Hopkins University, Baltimore, Maryland.
- Pathology.** G. H. COONS, Michigan Agricultural College, East Lansing, Michigan.—Assistant Editor, C. W. BENNETT, Michigan Agricultural College, East Lansing, Michigan.
- Pharmaceutical Botany and Pharmacognosy.** HEBER W. YOUNGKEN, Philadelphia College of Pharmacy and Science, Philadelphia, Pennsylvania.—Assistant Editor, E. N. GATHERCOAL, 701 South Wood St., Chicago, Illinois.
- Physiology.** B. M. DUGGAR, Missouri Botanical Garden, St. Louis, Missouri.—Assistant Editor, CARROLL W. DODGE, Harvard University, Cambridge, Massachusetts.
- Soil Science.** J. J. SKINNER, U. S. Bureau of Plant Industry, Washington, D. C.—Assistant Editor, F. M. SCHERTZ, U. S. Bureau of Plant Industry, Washington, D. C.
- Taxonomy of Vascular Plants.** J. M. GREENMAN, Missouri Botanical Garden, St. Louis, Missouri.—Assistant Editor, E. B. PATSON, University of Wyoming, Laramie, Wyoming.

BIBLIOGRAPHY COMMITTEE FOR 1921

J. R. SCHRAMM, *Chairman*, Cornell University, Ithaca, New York

H. O. BUCKMAN	R. HORMFP
W. H. CHANDLER	L. KNUDSON
A. J. EAMES	D. REDDICK
R. A. EMERSON	L. W. SHARP
H. M. FITZPATRICK	K. M. WIEGAND

R. S. HARRIS, *Secretary*